

Cubic equations for calculus (last 50 have no turning points)

	equation	turning points	centre	gradient	points	gradient
1.	$5x^3 + 8x^2 + x - 18$	(-0.0667, -18.0326) (-1, -16)	(-0.5333, -17.0163)	$m > -3.2667$	(3, 192) (-4.0667, -226.0326)	184
2.	$-2x^3 + 9x^2 + 11x - 8$	(-0.5207, -11.0052) (3.5207, 55.0052)	(1.5, 22)	$m < 24.5$	(10, -998) (-7, 1042)	-409
3.	$-2x^3 + 5x^2 - 3x + 8$	(0.3924, 7.4718) (1.2743, 8.1578)	(0.8333, 7.8148)	$m < 1.1667$	(-2, 50) (3.6667, -34.3704)	-47
4.	$2x^3 - 5x^2 - 11x - 13$	(2.4232, -40.5571) (-0.7566, -8.4058)	(0.8333, -24.4815)	$m > -15.1667$	(-3, -79) (4.6667, 30.037)	73
5.	$-x^3 - 10x^2 + 5x - 1$	(-6.9079, -183.0917) (0.2413, -0.3898)	(-3.3333, -91.7407)	$m < 38.3333$	(5, -351) (-11.6667, 167.5185)	-170
6.	$x^3 - x^2 - 2x - 4$	(1.2153, -6.1126) (-0.5486, -3.3689)	(0.3333, -4.7407)	$m > -2.3333$	(6, 164) (-5.3333, -173.4815)	94
7.	$x^3 - 7x^2 - 4x + 11$	(4.9367, -59.0315) (-0.2701, 11.55)	(2.3333, -23.7407)	$m > -20.3333$	(5, -59) (-0.3333, 11.5185)	1
8.	$4x^3 + 6x^2 - 5x + 6$	(0.3165, 5.1454) (-1.3165, 13.8546)	(-0.5, 9.5)	$m > -8$	(2, 52) (-3, -33)	67
9.	$x^3 - 10x^2 - 2x + 10$	(6.7652, -151.5805) (-0.0985, 10.099)	(3.3333, -70.7407)	$m > -35.3333$	(6, -146) (0.6667, 4.5185)	-14
10.	$-x^3 + 9x^2 + 11x - 19$	(-0.559, -22.162) (6.559, 158.162)	(3, 68)	$m < 38$	(2, 31) (4, 105)	35
11.	$2x^3 - 8x^2 + 3x + 15$	(2.4637, 3.741) (0.2029, 15.2961)	(1.3333, 9.5185)	$m > -7.6667$	(1, 12) (1.6667, 7.037)	-7
12.	$4x^3 - 9x^2 - 12x + 3$	(2, -25) (-0.5, 6.25)	(0.75, -9.375)	$m > -18.75$	(9, 2082) (-7.5, -2100.75)	798
13.	$3x^3 + 4x^2 - 2x - 18$	(0.2034, -18.2161) (-1.0923, -14.9527)	(-0.4444, -16.5844)	$m > -3.7778$	(-2, -22) (1.1111, -11.1687)	18
14.	$x^3 + 6x^2 - 4x + 12$	(0.3094, 11.3664) (-4.3094, 60.6336)	(-2, 36)	$m > -16$	(5, 267) (-9, -195)	131
15.	$5x^3 + 7x^2 - 12x - 13$	(0.5422, -16.6516) (-1.4755, 3.8841)	(-0.4667, -6.3837)	$m > -15.2667$	(6, 1247) (-6.9333, -1259.7674)	612
16.	$2x^3 + 10x^2 - 8x - 7$	(0.3609, -8.4907) (-3.6943, 58.1944)	(-1.6667, 24.8519)	$m > -24.6667$	(2, 33) (-5.3333, 16.7037)	56
17.	$-x^3 + 10x^2 + 4x + 1$	(-0.1943, 0.6077) (6.861, 176.2072)	(3.3333, 88.4074)	$m < 37.3333$	(-5, 356) (11.6667, -179.1852)	-171
18.	$4x^3 - 4x^2 - x + 4$	(0.7743, 2.6844) (-0.1076, 4.0563)	(0.3333, 3.3704)	$m > -2.3333$	(7, 1173) (-6.3333, -1166.2593)	531
19.	$-2x^3 - 3x^2 + 2x + 11$	(-1.2638, 7.7179) (0.2638, 11.2821)	(-0.5, 9.5)	$m < 3.5$	(9, -1672) (-10, 1691)	-538
20.	$-x^3 + 4x^2 + 4x - 15$	(-0.4305, -15.9009) (3.0972, 6.049)	(1.3333, -4.9259)	$m < 9.3333$	(-3, 36) (5.6667, -45.8519)	-47
21.	$5x^3 + 6x^2 - 7x$	(0.3916, -1.5208) (-1.1916, 8.4008)	(-0.4, 3.44)	$m > -9.4$	(-1, 8) (0.2, -1.12)	-4
22.	$4x^3 - 4x^2 - 4x - 4$	(1, -8) (-0.3333, -3.2593)	(0.3333, -5.6296)	$m > -5.3333$	(9, 2552) (-8.3333, -2563.2593)	896
23.	$3x^3 - 8x^2 - 3x - 7$	(1.9488, -21.0254) (-0.171, -6.7359)	(0.8889, -13.8807)	$m > -10.1111$	(10, 2163) (-8.2222, -2190.7613)	737
24.	$-x^3 + 8x^2 - 3x + 4$	(0.1946, 3.7118) (5.1387, 64.1401)	(2.6667, 33.9259)	$m < 18.3333$	(-5, 344) (10.3333, -276.1481)	-158
25.	$4x^3 + 5x^2 - x + 7$	(0.0902, 6.9534) (-0.9236, 9.0373)	(-0.4167, 7.9954)	$m > -3.0833$	(-3, -53) (2.1667, 68.9907)	77

	equation	turning points	centre	gradient	points	gradient
26.	$-x^3 + 6x^2 + 7x + 19$	(-0.5166, 17.1229) (4.5166, 80.8771)	(2, 49)	$m < 19$	(2, 49) (2, 49)	19
27.	$x^3 - 6x^2 + 9x + 16$	(3, 16) (1, 20)	(2, 18)	$m > -3$	(-2, -34) (6, 70)	45
28.	$4x^3 - 3x + 2$	(0.5, 1) (-0.5, 3)	(0, 2)	$m > -3$	(-3, -97) (3, 101)	105
29.	$-2x^3 - 4x^2 + 10x - 7$	(-2.1196, -27.1213) (0.7863, -2.5824)	(-0.6667, -14.8519)	$m < 12.6667$	(-1, -19) (-0.3333, -10.7037)	12
30.	$x^3 - 4x^2 - 10x - 9$	(3.5941, -50.1842) (-0.9274, -3.9639)	(1.3333, -27.0741)	$m > -15.3333$	(5, -34) (-2.3333, -20.1481)	25
31.	$2x^3 - 4x^2 - 3x + 9$	(1.6385, 2.1435) (-0.3052, 9.4862)	(0.6667, 5.8148)	$m > -5.6667$	(-2, -17) (3.3333, 28.6296)	37
32.	$-x^3 + 10x^2 - 2x - 7$	(0.1015, -7.101) (6.5651, 127.9158)	(3.3333, 60.4074)	$m < 31.3333$	(4, 81) (2.6667, 39.8148)	30
33.	$-x^3 + 6x^2 - 6x - 19$	(0.5858, -20.6569) (3.4142, -9.3431)	(2, -15)	$m < 6$	(0, -19) (4, -11)	-6
34.	$-x^3 + 8x^2 + 8x - 13$	(-0.4603, -14.8899) (5.7936, 107.4084)	(2.6667, 46.2593)	$m < 29.3333$	(5, 102) (0.3333, -9.4815)	13
35.	$4x^3 - 3x^2 - x - 1$	(0.6319, -1.8205) (-0.1319, -0.9295)	(0.25, -1.375)	$m > -1.75$	(-5, -571) (5.5, 568.25)	329
36.	$-x^3 + 2x^2 + 5x + 5$	(-0.7863, 2.7912) (2.1196, 15.0607)	(0.6667, 8.9259)	$m < 6.3333$	(0, 5) (1.3333, 12.8519)	5
37.	$3x^3 - 7x^2 - 4x + 1$	(1.8022, -11.384) (-0.2466, 1.5157)	(0.7778, -4.9342)	$m > -9.4444$	(6, 373) (-4.4444, -382.8683)	236
38.	$-x^3 + 10x^2 + 7x + 14$	(-0.3333, 12.8148) (7, 210)	(3.3333, 111.4074)	$m < 40.3333$	(-4, 210) (10.6667, 12.8148)	-121
39.	$2x^3 - 5x^2 - 12x - 5$	(2.4748, -35.0063) (-0.8081, 0.3767)	(0.8333, -17.3148)	$m > -16.1667$	(-4, -165) (5.6667, 130.3704)	124
40.	$5x^3 + x^2 - 4x + 20$	(0.454, 18.858) (-0.5873, 21.6813)	(-0.0667, 20.2696)	$m > -4.0667$	(7, 1756) (-7.1333, -1715.4607)	745
41.	$-x^3 - 4x^2 + 2x - 16$	(-2.8968, -31.051) (0.2301, -15.7638)	(-1.3333, -23.4074)	$m < 7.3333$	(-2, -28) (-0.6667, -18.8148)	6
42.	$-x^3 - 10x^2 - 10x - 4$	(-6.1222, -88.1231) (-0.5445, -1.3584)	(-3.3333, -44.7407)	$m < 23.3333$	(-1, -3) (-5.6667, -86.4815)	7
43.	$3x^3 - 8x^2 - 8x - 8$	(2.1847, -32.3788) (-0.4069, -6.2714)	(0.8889, -19.3251)	$m > -15.1111$	(6, 304) (-4.2222, -342.6502)	220
44.	$2x^3 + 10x^2 + 3x + 15$	(-0.1574, 14.7677) (-3.1759, 42.2693)	(-1.6667, 28.5185)	$m > -13.6667$	(-2, 33) (-1.3333, 24.037)	-13
45.	$2x^3 + 10x^2 + 2x - 19$	(-0.1032, -19.1021) (-3.2301, 11.4725)	(-1.6667, -3.8148)	$m > -14.6667$	(9, 2267) (-12.3333, -2274.6296)	668
46.	$5x^3 - 6x^2 + x + 12$	(0.7055, 11.4749) (0.0945, 12.0451)	(0.4, 11.76)	$m > -1.4$	(-5, -768) (5.8, 791.52)	436
47.	$4x^3 - 8x^2 + 3x - 4$	(1.1076, -5.0563) (0.2257, -3.6844)	(0.6667, -4.3704)	$m > -2.3333$	(5, 311) (-3.6667, -319.7407)	223
48.	$3x^3 + 10x^2 + 8x + 9$	(-0.5232, 7.1221) (-1.6991, 9.561)	(-1.1111, 8.3416)	$m > -3.1111$	(10, 4089) (-12.2222, -4072.3169)	1108
49.	$2x^3 - 7x^2 - 12x + 7$	(3, -38) (-0.6667, 11.2963)	(1.1667, -13.3519)	$m > -20.1667$	(-4, -185) (6.3333, 158.2963)	140
50.	$-2x^3 - 10x^2 + 8x + 1$	(-3.6943, -64.1944) (0.3609, 2.4907)	(-1.6667, -30.8519)	$m < 24.6667$	(-3, -59) (-0.3333, -2.7037)	14

	equation	turning points	centre	gradient	points	gradient
51.	$-2x^3 - 8x^2 + 6x + 17$	(-3, -19) (0.3333, 18.037)	(-1.3333, -0.4815)	$m < 16.6667$	(-4, -7) (1.3333, 6.037)	-26
52.	$5x^3 + 6x^2 - 8x - 12$	(0.4327, -13.9332) (-1.2327, -2.3868)	(-0.4, -8.16)	$m > -10.4$	(1, -9) (-1.8, -7.32)	19
53.	$3x^3 - 6x^2 - 3x + 4$	(1.5486, -3.8934) (-0.2153, 4.3378)	(0.6667, 0.2222)	$m > -7$	(-4, -272) (5.3333, 272.4444)	189
54.	$-x^3 + 5x^2 + 12x - 14$	(-0.9367, -20.0315) (4.2701, 50.55)	(1.6667, 15.2593)	$m < 20.3333$	(7, -28) (-3.6667, 58.5185)	-65
55.	$3x^3 - 3x^2 - 12x + 7$	(1.5352, -7.6383) (-0.8685, 13.1938)	(0.3333, 2.7778)	$m > -13$	(2, -5) (-1.3333, 10.5556)	12
56.	$3x^3 - 5x^2 - 8x + 5$	(1.6499, -8.3361) (-0.5388, 7.3896)	(0.5556, -0.4733)	$m > -10.7778$	(6, 425) (-4.8889, -425.9465)	256
57.	$2x^3 - 2x^2 - 11x + 19$	(1.7278, 4.3396) (-1.0611, 26.0308)	(0.3333, 15.1852)	$m > -11.6667$	(10, 1709) (-9.3333, -1678.6296)	549
58.	$5x^3 - 2x^2 - 10x - 3$	(0.9606, -10.0195) (-0.694, 1.3055)	(0.1333, -4.357)	$m > -10.2667$	(3, 84) (-2.7333, -92.7141)	113
59.	$2x^3 - 9x^2 - 12x + 5$	(3.5616, -61.5464) (-0.5616, 8.5464)	(1.5, -26.5)	$m > -25.5$	(-3, -94) (6, 41)	96
60.	$-2x^3 + 4x^2 + 4x + 8$	(-0.3874, 7.167) (1.7208, 16.5367)	(0.6667, 11.8519)	$m < 6.6667$	(0, 8) (1.3333, 15.7037)	4
61.	$x^3 + 8x^2 - 6x - 20$	(0.3518, -21.0772) (-5.6851, 88.929)	(-2.6667, 33.9259)	$m > -27.3333$	(10, 1720) (-15.3333, -1652.1481)	454
62.	$2x^3 - 2x^2 - 9x + 1$	(1.6026, -10.3281) (-0.936, 6.0318)	(0.3333, -2.1481)	$m > -9.6667$	(-1, 6) (1.6667, -10.2963)	1
63.	$3x^3 - 7x^2 - 9x - 18$	(2.0446, -40.0225) (-0.4891, -15.6236)	(0.7778, -27.823)	$m > -14.4444$	(-5, -523) (6.5556, 467.3539)	286
64.	$2x^3 + 3x^2 - 5x - 15$	(0.5408, -16.5103) (-1.5408, -7.4897)	(-0.5, -12)	$m > -6.5$	(5, 285) (-6, -309)	175
65.	$-2x^3 + 5x^2 + 5x - 13$	(-0.4027, -14.0721) (2.0694, 1.035)	(0.8333, -6.5185)	$m < 9.1667$	(8, -677) (-6.3333, 663.963)	-299
66.	$5x^3 + x^2 - 6x - 15$	(0.5693, -17.1691) (-0.7026, -12.0249)	(-0.0667, -14.597)	$m > -6.0667$	(-3, -123) (2.8667, 93.8059)	123
67.	$3x^3 - 8x^2 - 11x - 7$	(2.3075, -38.1197) (-0.5297, -3.8638)	(0.8889, -20.9918)	$m > -18.1111$	(-3, -127) (4.7778, 85.0165)	118
68.	$-x^3 - 6x^2 + 10x - 20$	(-4.708, -95.7175) (0.708, -16.2825)	(-2, -56)	$m < 22$	(-2, -56) (-2, -56)	22
69.	$3x^3 + 9x^2 - 6x - 3$	(0.291, -3.9099) (-2.291, 21.9099)	(-1, 9)	$m > -15$	(9, 2859) (-11, -2841)	885
70.	$-x^3 - 7x^2 - 11x + 1$	(-3.6667, -3.4815) (-1, 6)	(-2.3333, 1.2593)	$m < 5.3333$	(2, -57) (-6.6667, 59.5185)	-51
71.	$5x^3 - 10x^2 - 5x - 3$	(1.5486, -16.1557) (-0.2153, -2.4369)	(0.6667, -9.2963)	$m > -11.6667$	(-5, -853) (6.3333, 834.4074)	470
72.	$-x^3 - 9x^2 - 8x - 19$	(-5.5166, -80.8771) (-0.4834, -17.1229)	(-3, -49)	$m < 19$	(-1, -19) (-5, -79)	7
73.	$-x^3 + 10x^2 - 5x + 4$	(0.2602, 3.3584) (6.4065, 119.4564)	(3.3333, 61.4074)	$m < 28.3333$	(2, 26) (4.6667, 96.8148)	23
74.	$2x^3 - 3x^2 - 9x + 8$	(1.8229, -6.2601) (-0.8229, 12.2601)	(0.5, 3)	$m > -10.5$	(-5, -272) (6, 278)	171
75.	$2x^3 + 4x^2 + x + 2$	(-0.1396, 1.9329) (-1.1937, 3.1041)	(-0.6667, 2.5185)	$m > -1.6667$	(9, 1793) (-10.3333, -1787.963)	559

	equation	turning points	centre	gradient	points	gradient
76.	$-x^3 + 7x^2 - 7x$	(0.5695, -1.9009) (4.0972, 20.049)	(2.3333, 9.0741)	$m < 9.3333$	(10, -370) (-5.3333, 388.1481)	-167
77.	$3x^3 - 10x^2 - x - 4$	(2.2711, -22.7078) (-0.0489, -3.9754)	(1.1111, -13.3416)	$m > -12.1111$	(4, 24) (-1.7778, -50.6831)	63
78.	$4x^3 - 9x^2 - 8x$	(1.8587, -20.277) (-0.3587, 1.527)	(0.75, -9.375)	$m > -14.75$	(5, 235) (-3.5, -253.75)	202
79.	$-x^3 + 6x^2 + 6x$	(-0.4495, -1.3939) (4.4495, 57.3939)	(2, 28)	$m < 18$	(0, 0) (4, 56)	6
80.	$5x^3 + x^2 - 10x - 17$	(0.7525, -21.8282) (-0.8859, -10.8325)	(-0.0667, -16.3304)	$m > -10.0667$	(-5, -567) (4.8667, 534.3393)	355
81.	$2x^3 + x^2 - 7x + 8$	(0.9262, 3.9635) (-1.2596, 14.4068)	(-0.1667, 9.1852)	$m > -7.1667$	(-3, -16) (2.6667, 34.3704)	41
82.	$-x^3 + 7x^2 + 2$	(0, 2) (4.6667, 52.8148)	(2.3333, 27.4074)	$m < 16.3333$	(-2, 38) (6.6667, 16.8148)	-40
83.	$4x^3 + 7x^2 - 11x - 2$	(0.5378, -5.269) (-1.7045, 17.2783)	(-0.5833, 6.0046)	$m > -15.0833$	(2, 36) (-3.1667, -23.9907)	65
84.	$5x^3 + 10x^2 - 9x + 10$	(0.3553, 8.2889) (-1.6886, 29.637)	(-0.6667, 18.963)	$m > -15.6667$	(-1, 24) (-0.3333, 13.9259)	-14
85.	$4x^3 - 10x^2 - 12x + 6$	(2.135, -26.275) (-0.4684, 9.0157)	(0.8333, -8.6296)	$m > -20.3333$	(-2, -42) (3.6667, 24.7407)	76
86.	$4x^3 - 8x^2 - 8x - 19$	(1.7208, -36.0734) (-0.3874, -17.334)	(0.6667, -26.7037)	$m > -13.3333$	(4, 77) (-2.6667, -130.4074)	120
87.	$4x^3 + 8x^2 - 3x - 5$	(0.1667, -5.2593) (-1.5, 4)	(-0.6667, -0.6296)	$m > -8.3333$	(5, 680) (-6.3333, -681.2593)	377
88.	$x^3 - 5x^2 + 6x$	(2.5486, -0.6311) (0.7847, 2.1126)	(1.6667, 0.7407)	$m > -2.3333$	(-3, -90) (6.3333, 91.4815)	63
89.	$3x^3 - 4x^2 - 7x + 6$	(1.432, -3.417) (-0.5431, 8.1413)	(0.4444, 2.3621)	$m > -8.7778$	(3, 30) (-2.1111, -25.2757)	50
90.	$3x^3 + 6x^2 - 8x - 19$	(0.488, -21.1265) (-1.8214, -2.6513)	(-0.6667, -11.8889)	$m > -12$	(8, 1837) (-9.3333, -1860.7778)	664
91.	$-x^3 - 8x^2 - 4x + 1$	(-5.0704, -54.0354) (-0.263, 1.5168)	(-2.6667, -26.2593)	$m < 17.3333$	(1, -12) (-6.3333, -40.5185)	-23
92.	$-x^3 - 6x^2 - 3x + 5$	(-3.7321, -15.3923) (-0.2679, 5.3923)	(-2, -5)	$m < 9$	(-1, 3) (-3, -13)	6
93.	$2x^3 + 10x^2 - 12x + 12$	(0.5191, 8.7452) (-3.8525, 92.2918)	(-1.6667, 50.5185)	$m > -28.6667$	(-5, 72) (1.6667, 29.037)	38
94.	$5x^3 - 7x^2 - x + 9$	(1, 6) (-0.0667, 9.0341)	(0.4667, 7.517)	$m > -4.2667$	(-2, -57) (2.9333, 72.0341)	87
95.	$-x^3 + 2x^2 + 11x + 17$	(-1.3609, 8.2547) (2.6943, 41.5972)	(0.6667, 24.9259)	$m < 12.3333$	(0, 17) (1.3333, 32.8519)	11
96.	$3x^3 + 7x^2 + 3x + 14$	(-0.2566, 13.6404) (-1.2989, 15.339)	(-0.7778, 14.4897)	$m > -2.4444$	(1, 27) (-2.5556, 1.9794)	26
97.	$4x^3 + 6x^2 + x - 3$	(-0.0918, -3.0443) (-0.9082, -1.9557)	(-0.5, -2.5)	$m > -2$	(9, 3408) (-10, -3413)	1081
98.	$5x^3 + 3x^2$	(0, 0) (-0.4, 0.16)	(-0.2, 0.08)	$m > -0.6$	(3, 162) (-3.4, -161.84)	153
99.	$3x^3 + 7x^2 - 2x + 18$	(0.1317, 17.8649) (-1.6873, 26.8923)	(-0.7778, 22.3786)	$m > -7.4444$	(10, 3698) (-11.5556, -3653.2428)	1038
100.	$2x^3 - x^2 - 12x - 11$	(1.5907, -24.5687) (-1.2573, -1.4683)	(0.1667, -13.0185)	$m > -12.1667$	(8, 853) (-7.6667, -879.037)	356

equation	turning points	centre	gradient	points	gradient
101. $x^3 - 9x^2 + 10x + 16$	(5.3805, -34.9787) (0.6195, 18.9787)	(3, -8)	$m > -17$	(7, -12) (-1, -4)	31
102. $5x^3 - 9x^2 - 6x - 1$	(1.4718, -13.3855) (-0.2718, -0.1345)	(0.6, -6.76)	$m > -11.4$	(-2, -65) (3.2, 51.48)	90
103. $x^3 + 9x^2 - 5x - 5$	(0.266, -5.6744) (-6.266, 133.6744)	(-3, 64)	$m > -32$	(9, 1408) (-15, -1280)	400
104. $4x^3 + 7x^2 - 10x - 20$	(0.5, -22.75) (-1.6667, -2.4074)	(-0.5833, -12.5787)	$m > -14.0833$	(0, -20) (-1.1667, -5.1574)	-10
105. $4x^3 - 5x^2 + 2x + 8$	(0.5, 8.25) (0.3333, 8.2593)	(0.4167, 8.2546)	$m > -0.0833$	(4, 192) (-3.1667, -175.4907)	154
106. $-x^3 + 6x^2 - 10x + 5$	(1.1835, -0.0887) (2.8165, 2.0887)	(2, 1)	$m < 2$	(-2, 57) (6, -55)	-46
107. $-2x^3 - 4x^2 + 10x - 7$	(-2.1196, -27.1213) (0.7863, -2.5824)	(-0.6667, -14.8519)	$m < 12.6667$	(-4, 17) (2.6667, -46.7037)	-54
108. $4x^3 + 9x^2 - 8x + 8$	(0.3587, 6.473) (-1.8587, 28.277)	(-0.75, 17.375)	$m > -14.75$	(8, 2568) (-9.5, -2533.25)	904
109. $4x^3 - 7x^2 - 8x - 8$	(1.5868, -22.3381) (-0.4201, -6.1712)	(0.5833, -14.2546)	$m > -12.0833$	(0, -8) (1.1667, -20.5093)	-8
110. $2x^3 + 6x^2 + 3x + 13$	(-0.2929, 12.5858) (-1.7071, 15.4142)	(-1, 14)	$m > -3$	(7, 1014) (-9, -986)	381
111. $-2x^3 + 2x^2 + 11x - 16$	(-1.0611, -23.0308) (1.7278, -1.3396)	(0.3333, -12.1852)	$m < 11.6667$	(9, -1213) (-8.3333, 1188.6296)	-439
112. $-x^3 + 7x^2 - x - 8$	(0.0726, -8.0361) (4.5941, 38.1842)	(2.3333, 15.0741)	$m < 15.3333$	(6, 22) (-1.3333, 8.1481)	-25
113. $5x^3 + 9x^2 - 2x - 18$	(0.1024, -18.1051) (-1.3024, -11.1749)	(-0.6, -14.64)	$m > -7.4$	(9, 4338) (-10.2, -4367.28)	1375
114. $3x^3 + 10x^2 + 11x + 1$	(-1, -3) (-1.2222, -2.9835)	(-1.1111, -2.9918)	$m > -0.1111$	(8, 2265) (-10.2222, -2270.9835)	747
115. $5x^3 - x^2 - 5x + 11$	(0.6479, 8.7006) (-0.5145, 12.6268)	(0.0667, 10.6637)	$m > -5.0667$	(10, 4861) (-9.8667, -4839.6726)	1475
116. $5x^3 - 5x^2 - 5x + 2$	(1, -3) (-0.3333, 2.9259)	(0.3333, -0.037)	$m > -6.6667$	(10, 4452) (-9.3333, -4452.0741)	1395
117. $-x^3 + 8x^2 + 2x + 13$	(-0.1222, 12.8769) (5.4555, 99.6416)	(2.6667, 56.2593)	$m < 23.3333$	(-5, 328) (10.3333, -215.4815)	-153
118. $4x^3 - 3x^2 - 10x + 13$	(1.1965, 3.5919) (-0.6965, 17.1581)	(0.25, 10.375)	$m > -10.75$	(6, 709) (-5.5, -688.25)	386
119. $-x^3 + x^2 + 12x - 15$	(-1.6943, -27.5972) (2.3609, 5.7453)	(0.3333, -10.9259)	$m < 12.3333$	(3, 3) (-2.3333, -24.8519)	-9
120. $-x^3 + 7x^2 + 7x - 20$	(-0.4555, -21.6416) (5.1222, 65.1231)	(2.3333, 21.7407)	$m < 23.3333$	(8, -28) (-3.3333, 71.4815)	-73
121. $5x^3 - 10x^2 - 6x - 8$	(1.5856, -22.7229) (-0.2523, -7.2031)	(0.6667, -14.963)	$m > -12.6667$	(1, -19) (0.3333, -10.9259)	-11
122. $5x^3 + 10x^2 + 2x - 12$	(-0.1089, -12.1057) (-1.2244, -8.6351)	(-0.6667, -10.3704)	$m > -4.6667$	(-1, -9) (-0.3333, -11.7407)	-3
123. $4x^3 - 10x^2 + 3x - 18$	(1.5, -22.5) (0.1667, -17.7593)	(0.8333, -20.1296)	$m > -5.3333$	(5, 247) (-3.3333, -287.2593)	203
124. $3x^3 - 5x^2 - 8x + 13$	(1.6499, -0.3361) (-0.5388, 15.3896)	(0.5556, 7.5267)	$m > -10.7778$	(-5, -447) (6.1111, 462.0535)	267
125. $x^3 + 4x^2 - 5x + 9$	(0.5226, 7.6222) (-3.1893, 33.1926)	(-1.3333, 20.4074)	$m > -10.3333$	(1, 9) (-3.6667, 31.8148)	6

equation	turning points	centre	gradient	points	gradient
126. $-2x^3 + 4x^2 + 8x + 13$	(-0.6667, 10.037) (2, 29)	(0.6667, 19.5185)	$m < 10.6667$	(-1, 11) (2.3333, 28.037)	-6
127. $4x^3 + 8x^2 - 4x + 10$	(0.2153, 9.5496) (-1.5486, 20.5245)	(-0.6667, 15.037)	$m > -9.3333$	(-4, -102) (2.6667, 132.0741)	124
128. $4x^3 + 6x^2 + 2x - 14$	(-0.2113, -14.1925) (-0.7887, -13.8075)	(-0.5, -14)	$m > -1$	(2, 46) (-3, -74)	74
129. $3x^3 - 10x^2 - 2x - 5$	(2.3181, -26.0025) (-0.0959, -4.9028)	(1.1111, -15.4527)	$m > -13.1111$	(7, 520) (-4.7778, -550.9053)	299
130. $x^3 + 5x^2 + 7x + 9$	(-1, 6) (-2.3333, 7.1852)	(-1.6667, 6.5926)	$m > -1.3333$	(0, 9) (-3.3333, 4.1852)	7
131. $x^3 - 3x^2 - 4x - 12$	(2.5275, -25.1285) (-0.5275, -10.8715)	(1, -18)	$m > -7$	(9, 438) (-7, -474)	185
132. $3x^3 - 4x^2 - 4x + 12$	(1.2457, 6.6092) (-0.3568, 12.7817)	(0.4444, 9.6955)	$m > -5.7778$	(-4, -228) (4.8889, 247.3909)	172
133. $4x^3 + 10x^2 - 9x - 1$	(0.3685, -2.7584) (-2.0352, 25.0177)	(-0.8333, 11.1296)	$m > -17.3333$	(-2, 25) (0.3333, -2.7407)	-1
134. $4x^3 + 7x^2 - 5x - 9$	(0.2867, -9.7639) (-1.4534, 0.7731)	(-0.5833, -4.4954)	$m > -9.0833$	(-4, -133) (2.8333, 124.0093)	131
135. $-x^3 + 9x^2 - 4x + 10$	(0.2311, 9.5439) (5.7689, 94.4561)	(3, 52)	$m < 23$	(7, 80) (-1, 24)	-25
136. $-x^3 + 4x^2 - 3x + 4$	(0.4514, 3.3689) (2.2153, 6.1126)	(1.3333, 4.7407)	$m < 2.3333$	(4, -8) (-1.3333, 17.4815)	-19
137. $-2x^3 + 9x^2 - 2x - 11$	(0.1156, -11.114) (2.8844, 10.114)	(1.5, -0.5)	$m < 11.5$	(-2, 45) (5, -46)	-62
138. $x^3 - 9x^2 - 4x - 20$	(6.2146, -152.434) (-0.2146, -19.566)	(3, -86)	$m > -31$	(-2, -56) (8, -116)	44
139. $-2x^3 + 3x^2 + 2x + 14$	(-0.2638, 13.7179) (1.2638, 17.2821)	(0.5, 15.5)	$m < 3.5$	(0, 14) (1, 17)	2
140. $2x^3 + 5x^2 - 11x - 8$	(0.7566, -12.5942) (-2.4232, 19.5571)	(-0.8333, 3.4815)	$m > -15.1667$	(-3, 16) (1.3333, -9.037)	13
141. $-x^3 - 7x^2 + 9x + 15$	(-5.2393, -80.4854) (0.5726, 17.6706)	(-2.3333, -31.4074)	$m < 25.3333$	(-3, -48) (-1.6667, -14.8148)	24
142. $5x^3 - 9x^2 - 6x - 10$	(1.4718, -22.3855) (-0.2718, -9.1345)	(0.6, -15.76)	$m > -11.4$	(1, -20) (0.2, -11.52)	-9
143. $x^3 - x^2 - 5x - 5$	(1.6667, -11.4815) (-1, -2)	(0.3333, -6.7407)	$m > -5.3333$	(-4, -65) (4.6667, 51.5185)	51
144. $-x^3 - 2x^2 + 4x - 8$	(-2, -16) (0.6667, -6.5185)	(-0.6667, -11.2593)	$m < 5.3333$	(5, -163) (-6.3333, 140.4815)	-91
145. $2x^3 + 5x^2 + x - 4$	(-0.1069, -4.0522) (-1.5598, -0.9848)	(-0.8333, -2.5185)	$m > -3.1667$	(2, 34) (-3.6667, -39.037)	45
146. $4x^3 + 10x^2 - 12x - 1$	(0.4684, -4.0157) (-2.135, 31.275)	(-0.8333, 13.6296)	$m > -20.3333$	(9, 3617) (-10.6667, -3589.7407)	1140
147. $-x^3 - 3x^2 + 6x - 3$	(-2.7321, -21.3923) (0.7321, -0.6077)	(-1, -11)	$m < 9$	(6, -291) (-8, 269)	-138
148. $-x^3 + 6x^2 + 11x + 18$	(-0.7689, 13.5439) (4.7689, 98.4561)	(2, 56)	$m < 23$	(-1, 14) (5, 98)	-4
149. $2x^3 - 10x^2 + 12x + 6$	(2.5486, 4.7377) (0.7847, 10.2252)	(1.6667, 7.4815)	$m > -4.6667$	(9, 762) (-5.6667, -747.037)	318
150. $x^3 + 6x^2 - 8x + 12$	(0.582, 9.5735) (-4.582, 78.4265)	(-2, 44)	$m > -20$	(2, 28) (-6, 60)	28

equation	turning points	centre	gradient	points	gradient
151. $2x^3 - 8x^2 + 9x + 6$	(1.8604, 7.9329) (0.8063, 9.1041)	(1.3333, 8.5185)	$m > -1.6667$	(2, 8) (0.6667, 9.037)	1
152. $-x^3 + 2x^2 + 9x - 11$	(-1.1893, -17.1926) (2.5226, 8.3778)	(0.6667, -4.4074)	$m < 10.3333$	(5, -41) (-3.6667, 32.1852)	-46
153. $2x^3 - 4x^2 - 11x + 8$	(2.1759, -14.2693) (-0.8426, 13.2323)	(0.6667, -0.5185)	$m > -13.6667$	(7, 421) (-5.6667, -422.037)	227
154. $-2x^3 + 10x^2 + 4x - 1$	(-0.1893, -1.3853) (3.5226, 49.7557)	(1.6667, 24.1852)	$m < 20.6667$	(8, -353) (-4.6667, 401.3704)	-220
155. $x^3 + x^2 - 6x + 2$	(1.1196, -2.0607) (-1.7863, 10.2088)	(-0.3333, 4.0741)	$m > -6.3333$	(0, 2) (-0.6667, 6.1481)	-6
156. $2x^3 + 10x^2 + 2x + 15$	(-0.1032, 14.8979) (-3.2301, 45.4725)	(-1.6667, 30.1852)	$m > -14.6667$	(2, 75) (-5.3333, -14.6296)	66
157. $5x^3 + 2x^2 - 7x + 1$	(0.5627, -1.4148) (-0.8294, 5.3289)	(-0.1333, 1.957)	$m > -7.2667$	(7, 1765) (-7.2667, -1761.0859)	756
158. $5x^3 - 6x^2 - 9x + 12$	(1.2718, 1.1345) (-0.4718, 14.3855)	(0.4, 7.76)	$m > -11.4$	(-2, -34) (2.8, 49.52)	75
159. $4x^3 + 8x^2 - 4x - 12$	(0.2153, -12.4504) (-1.5486, -1.4755)	(-0.6667, -6.963)	$m > -9.3333$	(-4, -124) (2.6667, 110.0741)	124
160. $-2x^3 - 3x^2 + 9x + 6$	(-1.8229, -8.2601) (0.8229, 10.2601)	(-0.5, 1)	$m < 10.5$	(-5, 136) (4, -134)	-111
161. $x^3 - 5x^2 - 12x + 4$	(4.2701, -60.55) (-0.9367, 10.0315)	(1.6667, -25.2593)	$m > -20.3333$	(10, 384) (-6.6667, -434.5185)	188
162. $-2x^3 + 2x^2 + 9x + 2$	(-0.936, -3.0318) (1.6026, 13.3281)	(0.3333, 5.1481)	$m < 9.6667$	(-1, -3) (1.6667, 13.2963)	-1
163. $3x^3 - 10x^2 + 2x - 15$	(2.1173, -27.1197) (0.105, -14.8968)	(1.1111, -21.0082)	$m > -9.1111$	(0, -15) (2.2222, -27.0165)	2
164. $x^3 - 6x^2 + 5x + 13$	(3.5275, -0.1285) (0.4725, 14.1285)	(2, 7)	$m > -7$	(-3, -83) (7, 97)	68
165. $5x^3 + 9x^2 - 5x + 3$	(0.2327, 2.3868) (-1.4327, 13.9332)	(-0.6, 8.16)	$m > -10.4$	(-1, 12) (-0.2, 4.32)	-8
166. $-2x^3 + 9x^2 - 12x - 11$	(1, -16) (2, -15)	(1.5, -15.5)	$m < 1.5$	(9, -848) (-6, 817)	-336
167. $2x^3 - 8x^2 - 5x - 13$	(2.9492, -46.0253) (-0.2826, -12.271)	(1.3333, -29.1481)	$m > -15.6667$	(2, -39) (0.6667, -19.2963)	-13
168. $-2x^3 + 7x^2 - 5x + 19$	(0.4402, 17.9848) (1.8931, 21.0522)	(1.1667, 19.5185)	$m < 3.1667$	(-2, 73) (4.3333, -33.963)	-57
169. $x^3 - 7x^2 + 6x - 16$	(4.1893, -40.1926) (0.4774, -14.6222)	(2.3333, -27.4074)	$m > -10.3333$	(-2, -64) (6.6667, 9.1852)	46
170. $5x^3 + 9x^2 - 8x + 1$	(0.3452, -0.4835) (-1.5452, 16.4035)	(-0.6, 7.96)	$m > -13.4$	(-2, 13) (0.8, 2.92)	16
171. $5x^3 - 8x + 4$	(0.7303, 0.1051) (-0.7303, 7.8949)	(0, 4)	$m > -8$	(2, 28) (-2, -20)	52
172. $-2x^3 + 10x^2 - 9x - 11$	(0.5363, -13.259) (2.7971, -1.7039)	(1.6667, -7.4815)	$m < 7.6667$	(-3, 160) (6.3333, -174.963)	-123
173. $-x^3 - 5x^2 + 4x + 16$	(-3.6943, -16.5972) (0.3609, 16.7453)	(-1.6667, 0.0741)	$m < 12.3333$	(-1, 8) (-2.3333, -7.8519)	11
174. $3x^3 - 7x^2 - 3x - 19$	(1.7464, -29.6095) (-0.1909, -18.7033)	(0.7778, -24.1564)	$m > -8.4444$	(3, -10) (-1.4444, -38.3128)	36
175. $x^3 - 10x^2 + 11x + 13$	(6.0618, -65.031) (0.6049, 16.2162)	(3.3333, -24.4074)	$m > -22.3333$	(2, 3) (4.6667, -51.8148)	-17

equation	turning points	centre	gradient	points	gradient
176. $-2x^3 + 3x^2 + 8x + 14$	(-0.7583, 10.5307) (1.7583, 26.4693)	(0.5, 18.5)	$m < 9.5$	(0, 14) (1, 23)	8
177. $4x^3 + 9x^2 - 10x$	(0.4315, -2.3179) (-1.9315, 24.0679)	(-0.75, 10.875)	$m > -16.75$	(3, 159) (-4.5, -137.25)	152
178. $-2x^3 + x^2 + 12x - 17$	(-1.2573, -26.5317) (1.5907, -3.4313)	(0.1667, -14.9815)	$m < 12.1667$	(-3, 10) (3.3333, -39.963)	-48
179. $x^3 + 7x^2 - 4x + 6$	(0.2701, 5.45) (-4.9367, 76.0315)	(-2.3333, 40.7407)	$m > -20.3333$	(7, 664) (-11.6667, -582.5185)	241
180. $x^3 - 3x^2 - 3x - 3$	(2.4142, -13.6569) (-0.4142, -2.3431)	(1, -8)	$m > -6$	(9, 456) (-7, -472)	186
181. $3x^3 + 9x^2 - 3x - 12$	(0.1547, -12.2376) (-2.1547, 6.2376)	(-1, -3)	$m > -12$	(3, 141) (-5, -147)	132
182. $2x^3 + 2x^2 - 9x + 16$	(0.936, 10.9682) (-1.6026, 27.3281)	(-0.3333, 19.1481)	$m > -9.6667$	(9, 1555) (-9.6667, -1516.7037)	513
183. $2x^3 - 7x^2 + 6x + 19$	(1.7676, 18.7801) (0.5657, 20.5162)	(1.1667, 19.6481)	$m > -2.1667$	(2, 19) (0.3333, 20.2963)	2
184. $3x^3 - 3x^2 - 9x - 11$	(1.3874, -21.2495) (-0.7208, -7.1949)	(0.3333, -14.2222)	$m > -10$	(9, 1852) (-8.3333, -1880.4444)	666
185. $2x^3 - 4x^2 - x + 3$	(1.4484, -0.7628) (-0.1151, 3.0591)	(0.6667, 1.1481)	$m > -3.6667$	(-4, -185) (5.3333, 187.2963)	127
186. $-x^3 + 3x^2 + 7x + 1$	(-0.8257, -2.1716) (2.8257, 22.1716)	(1, 10)	$m < 10$	(-3, 34) (5, -14)	-38
187. $4x^3 + 10x^2 - 12x - 16$	(0.4684, -19.0157) (-2.135, 16.275)	(-0.8333, -1.3704)	$m > -20.3333$	(-1, 2) (-0.6667, -4.7407)	-20
188. $-2x^3 + 8x^2 - 7x + 20$	(0.5516, 18.2372) (2.1151, 22.0591)	(1.3333, 20.1481)	$m < 3.6667$	(5, -65) (-2.3333, 105.2963)	-77
189. $-2x^3 + 8x^2 + 11x - 2$	(-0.567, -5.3005) (3.2336, 49.5968)	(1.3333, 22.1481)	$m < 21.6667$	(1, 15) (1.6667, 29.2963)	21
190. $x^3 + 4x^2 - 6x - 3$	(0.6103, -4.9446) (-3.277, 24.4261)	(-1.3333, 9.7407)	$m > -11.3333$	(2, 9) (-4.6667, 10.4815)	22
191. $-x^3 - x^2 + 9$	(-0.6667, 8.8519) (0, 9)	(-0.3333, 8.9259)	$m < 0.3333$	(4, -71) (-4.6667, 88.8519)	-56
192. $-x^3 - 7x^2 + 3x + 1$	(-4.8719, -64.127) (0.2053, 1.3122)	(-2.3333, -31.4074)	$m < 19.3333$	(2, -29) (-6.6667, -33.8148)	-37
193. $2x^3 - 5x^2 - 12x - 14$	(2.4748, -44.0063) (-0.8081, -8.6233)	(0.8333, -26.3148)	$m > -16.1667$	(10, 1366) (-8.3333, -1418.6296)	488
194. $x^3 + 3x^2 - 3x + 4$	(0.4142, 3.3431) (-2.4142, 14.6569)	(-1, 9)	$m > -6$	(10, 1274) (-12, -1256)	357
195. $4x^3 - 8x - 14$	(0.8165, -18.3546) (-0.8165, -9.6454)	(0, -14)	$m > -8$	(-3, -98) (3, 70)	100
196. $-2x^3 - 3x^2 + 8x + 2$	(-1.7583, -10.4693) (0.7583, 5.4693)	(-0.5, -2.5)	$m < 9.5$	(-5, 137) (4, -142)	-112
197. $3x^3 + 7x^2 + 13$	(0, 13) (-1.5556, 18.6461)	(-0.7778, 15.823)	$m > -5.4444$	(8, 1997) (-9.5556, -1965.3539)	688
198. $2x^3 + 9x^2 - 6x - 18$	(0.3028, -18.9361) (-3.3028, 27.9361)	(-1.5, 4.5)	$m > -19.5$	(7, 1067) (-10, -1058)	414
199. $5x^3 - 7x^2 + x - 2$	(0.8554, -3.137) (0.0779, -1.9622)	(0.4667, -2.5496)	$m > -2.2667$	(-5, -807) (5.9333, 801.9007)	446
200. $5x^3 + x^2 - x + 1$	(0.2, 0.88) (-0.3333, 1.2593)	(-0.0667, 1.0696)	$m > -1.0667$	(-1, -2) (0.8667, 4.1393)	12

equation	turning points	centre	gradient	points	gradient
201. $x^3 - 9x^2 - 7x$	(6.3665, -151.3074) (-0.3665, 1.3074)	(3, -75)	$m > -34$	(3, -75) (3, -75)	-34
202. $4x^3 + 8x^2 - 7x + 5$	(0.3471, 3.7014) (-1.6805, 20.3727)	(-0.6667, 12.037)	$m > -12.3333$	(-2, 19) (0.6667, 5.0741)	9
203. $-x^3 + 5x^2 - 4x - 1$	(0.4648, -1.8794) (2.8685, 5.0646)	(1.6667, 1.5926)	$m < 4.3333$	(2, 3) (1.3333, 0.1852)	4
204. $-x^3 - 10x^2 + x + 3$	(-6.7163, -151.8397) (0.0496, 3.0249)	(-3.3333, -74.4074)	$m < 34.3333$	(-2, -31) (-4.6667, -117.8148)	29
205. $2x^3 + 9x^2 + 5x$	(-0.3098, -0.7447) (-2.6902, 12.7447)	(-1.5, 6)	$m > -8.5$	(3, 150) (-6, -138)	113
206. $2x^3 + 9x^2 - 2x + 6$	(0.1073, 5.8915) (-3.1073, 39.1085)	(-1.5, 22.5)	$m > -15.5$	(-3, 39) (0, 6)	-2
207. $2x^3 + 3x^2 - 6x + 16$	(0.618, 13.9098) (-1.618, 25.0902)	(-0.5, 19.5)	$m > -7.5$	(10, 2256) (-11, -2217)	654
208. $2x^3 + 6x^2 - 10x + 6$	(0.633, 2.5814) (-2.633, 37.4186)	(-1, 20)	$m > -16$	(3, 84) (-5, -44)	80
209. $-2x^3 + 10x^2 - 2x - 15$	(0.1032, -15.1021) (3.2301, 15.4725)	(1.6667, 0.1852)	$m < 14.6667$	(5, -25) (-1.6667, 25.3704)	-52
210. $-2x^3 - 6x^2 + 3x + 10$	(-2.2247, -4.3485) (0.2247, 10.3485)	(-1, 3)	$m < 9$	(1, 5) (-3, 1)	-15
211. $5x^3 - 5x^2 - 20$	(0.6667, -20.7407) (0, -20)	(0.3333, -20.3704)	$m > -1.6667$	(0, -20) (0.6667, -20.7407)	0
212. $3x^3 - 6x^2 - 8x - 20$	(1.8214, -36.3487) (-0.488, -17.8735)	(0.6667, -27.1111)	$m > -12$	(3, -17) (-1.6667, -37.2222)	37
213. $-2x^3 + 7x^2 + 5x - 15$	(-0.3147, -15.8179) (2.648, 10.1883)	(1.1667, -2.8148)	$m < 13.1667$	(6, -165) (-3.6667, 159.3704)	-127
214. $-x^3 - 5x^2 + 8x + 3$	(-4, -45) (0.6667, 5.8148)	(-1.6667, -19.5926)	$m < 16.3333$	(0, 3) (-3.3333, -42.1852)	8
215. $2x^3 + 7x^2 - 4x + 3$	(0.2573, 2.4683) (-2.5907, 25.5687)	(-1.1667, 14.0185)	$m > -12.1667$	(10, 2663) (-12.3333, -2634.963)	736
216. $x^3 + 3x^2 - 5x + 15$	(0.633, 13.2907) (-2.633, 30.7093)	(-1, 22)	$m > -8$	(-4, 19) (2, 25)	19
217. $5x^3 - 10x^2 - 6x - 20$	(1.5856, -34.7229) (-0.2523, -19.2031)	(0.6667, -26.963)	$m > -12.6667$	(0, -20) (1.3333, -33.9259)	-6
218. $x^3 - 5x^2 - 9x - 10$	(4.0704, -62.0354) (-0.737, -6.4832)	(1.6667, -34.2593)	$m > -17.3333$	(5, -55) (-1.6667, -13.5185)	16
219. $-x^3 + 10x^2 + 2x + 19$	(-0.0985, 18.901) (6.7652, 180.5805)	(3.3333, 99.7407)	$m < 35.3333$	(10, 39) (-3.3333, 160.4815)	-98
220. $2x^3 - 6x^2 - 10x - 10$	(2.633, -41.4186) (-0.633, -6.5814)	(1, -24)	$m > -16$	(5, 40) (-3, -88)	80
221. $2x^3 - 3x^2 - 10x + 20$	(1.8844, 3.886) (-0.8844, 25.114)	(0.5, 14.5)	$m > -11.5$	(-4, -116) (5, 145)	110
222. $-2x^3 + 3x^2 - x - 16$	(0.2113, -16.0962) (0.7887, -15.9038)	(0.5, -16)	$m < 0.5$	(6, -346) (-5, 314)	-181
223. $2x^3 - 8x^2 + 5x - 4$	(2.3052, -10.4862) (0.3615, -3.1435)	(1.3333, -6.8148)	$m > -5.6667$	(1, -5) (1.6667, -8.6296)	-5
224. $x^3 + x^2 - 12x + 11$	(1.6943, -1.5972) (-2.3609, 31.7453)	(-0.3333, 15.0741)	$m > -12.3333$	(2, -1) (-2.6667, 31.1481)	4
225. $x^3 + 3x^2 - 4x + 20$	(0.5275, 18.8715) (-2.5275, 33.1285)	(-1, 26)	$m > -7$	(7, 482) (-9, -430)	185

equation	turning points	centre	gradient	points	gradient
226. $2x^3 + 3x^2 - 7x - 4$	(0.6902, -6.7447) (-1.6902, 6.7447)	(-0.5, 0)	$m > -8.5$	(2, 10) (-3, -10)	29
227. $-x^3 + 7x^2 + 8x + 3$	(-0.5147, 0.8732) (5.1813, 93.275)	(2.3333, 47.0741)	$m < 24.3333$	(10, -217) (-5.3333, 311.1481)	-152
228. $2x^3 - 6x^2 + x - 3$	(1.9129, -9.0429) (0.0871, -2.9571)	(1, -6)	$m > -5$	(3, 0) (-1, -12)	19
229. $5x^3 + 9x^2 + 17$	(0, 17) (-1.2, 21.32)	(-0.6, 19.16)	$m > -5.4$	(8, 3153) (-9.2, -3114.68)	1104
230. $x^3 + x^2 - 8x - 7$	(1.3333, -13.5185) (-2, 5)	(-0.3333, -4.2593)	$m > -8.3333$	(-2, 5) (1.3333, -13.5185)	0
231. $5x^3 - 6x^2 - 7x + 20$	(1.1916, 11.5992) (-0.3916, 21.5208)	(0.4, 16.56)	$m > -9.4$	(1, 12) (-0.2, 21.12)	-4
232. $5x^3 + 8x^2 + 3x - 8$	(-0.2427, -8.3284) (-0.8239, -7.8376)	(-0.5333, -8.083)	$m > -1.2667$	(0, -8) (-1.0667, -8.1659)	3
233. $-2x^3 - x^2 + 6x + 5$	(-1.1805, -0.1863) (0.8471, 8.1493)	(-0.1667, 3.9815)	$m < 6.1667$	(6, -427) (-6.3333, 434.963)	-222
234. $3x^3 + 8x^2 - 7x + 11$	(0.3633, 9.6566) (-2.141, 33.2158)	(-0.8889, 21.4362)	$m > -14.1111$	(0, 11) (-1.7778, 31.8724)	-7
235. $5x^3 + 6x^2 - 8x - 10$	(0.4327, -11.9332) (-1.2327, -0.3868)	(-0.4, -6.16)	$m > -10.4$	(1, -7) (-1.8, -5.32)	19
236. $-2x^3 - 7x^2 - 8x + 1$	(-1.3333, 3.963) (-1, 4)	(-1.1667, 3.9815)	$m < 0.1667$	(-3, 16) (0.6667, -8.037)	-20
237. $3x^3 + 9x^2 + 7x - 7$	(-0.5286, -8.6285) (-1.4714, -7.3715)	(-1, -8)	$m > -2$	(0, -7) (-2, -9)	7
238. $-2x^3 + 7x^2 + 3x - 4$	(-0.1976, -4.304) (2.5309, 16.0078)	(1.1667, 5.8519)	$m < 11.1667$	(6, -166) (-3.6667, 177.7037)	-129
239. $x^3 + 10x^2 - 5x - 12$	(0.2413, -12.6102) (-6.9079, 170.0917)	(-3.3333, 78.7407)	$m > -38.3333$	(5, 338) (-11.6667, -180.5185)	170
240. $-2x^3 - 7x^2 - 5x - 20$	(-1.8931, -22.0522) (-0.4402, -18.9848)	(-1.1667, -20.5185)	$m < 3.1667$	(10, -2770) (-12.3333, 2728.963)	-745
241. $-x^3 - 8x^2 - 6x + 6$	(-4.9274, -39.0361) (-0.4059, 7.1842)	(-2.6667, -15.9259)	$m < 15.3333$	(10, -1854) (-15.3333, 1822.1481)	-466
242. $x^3 + 7x^2 + 8x - 18$	(-0.6667, -20.5185) (-4, -2)	(-2.3333, -11.2593)	$m > -8.3333$	(1, -2) (-5.6667, -20.5185)	25
243. $4x^3 - 5x^2 - 8x - 9$	(1.3333, -19.0741) (-0.5, -6.75)	(0.4167, -12.912)	$m > -10.0833$	(7, 1062) (-6.1667, -1087.8241)	510
244. $x^3 - 4x^2 - 5x + 16$	(3.1893, -8.1926) (-0.5226, 17.3778)	(1.3333, 4.5926)	$m > -10.3333$	(5, 16) (-2.3333, -6.8148)	30
245. $-2x^3 + 9x^2 - 9x - 2$	(0.634, -4.5981) (2.366, 0.5981)	(1.5, -2)	$m < 4.5$	(2, 0) (1, -4)	3
246. $2x^3 - 10x + 13$	(1.291, 4.3934) (-1.291, 21.6066)	(0, 13)	$m > -10$	(-1, 21) (1, 5)	-4
247. $4x^3 + x^2 - 7x - 16$	(0.685, -19.0401) (-0.8516, -11.784)	(-0.0833, -15.412)	$m > -7.0833$	(-3, -94) (2.8333, 63.1759)	95
248. $-2x^3 - 3x^2 + 7x + 17$	(-1.6902, 6.2553) (0.6902, 19.7447)	(-0.5, 13)	$m < 8.5$	(-5, 157) (4, -131)	-113
249. $5x^3 - x^2 - 4x + 12$	(0.5873, 10.3187) (-0.454, 13.142)	(0.0667, 11.7304)	$m > -4.0667$	(-1, 10) (1.1333, 13.4607)	13
250. $5x^3 + 4x^2 - 3x - 14$	(0.254, -14.422) (-0.7873, -11.5987)	(-0.2667, -13.0104)	$m > -4.0667$	(9, 3928) (-9.5333, -3954.0207)	1284

equation	turning points	centre	gradient	points	gradient
251. $5x^3 - 3x^2 + 11x - 2$	none	(0.2, 0.12)	$m > 10.4$	(7, 1643) (-6.6, -1642.76)	704
252. $x^3 - x^2 + 11x - 6$	none	(0.3333, -2.4074)	$m > 10.6667$	(7, 365) (-6.3333, -369.8148)	144
253. $-x^3 - 3x^2 - 12x + 5$	none	(-1, 15)	$m < -9$	(1, -11) (-3, 41)	-21
254. $x^3 + 6x + 13$	none	(0, 13)	$m > 6$	(7, 398) (-7, -372)	153
255. $3x^3 + 5x^2 + 5x - 11$	none	(-0.5556, -12.749)	$m > 2.2222$	(-2, -25) (0.8889, -0.4979)	21
256. $-2x^3 + 4x^2 - 3x + 7$	none	(0.6667, 6.1852)	$m < -0.3333$	(-3, 106) (4.3333, -93.6296)	-81
257. $2x^3 - 3x^2 + 10x + 15$	none	(0.5, 19.5)	$m > 8.5$	(3, 72) (-2, -33)	46
258. $3x^3 - x^2 + x - 1$	none	(0.1111, -0.8971)	$m > 0.8889$	(-4, -213) (4.2222, 211.2058)	153
259. $4x^3 + 6x^2 + 11x + 1$	none	(-0.5, -3.5)	$m > 8$	(-1, -8) (0, 1)	11
260. $-x^3 - x^2 - 10x + 16$	none	(-0.3333, 19.2593)	$m < -9.6667$	(8, -640) (-8.6667, 678.5185)	-218
261. $x^3 - x^2 + 9x - 4$	none	(0.3333, -1.0741)	$m > 8.6667$	(3, 41) (-2.3333, -43.1481)	30
262. $5x^3 + 3x + 17$	none	(0, 17)	$m > 3$	(-3, -127) (3, 161)	138
263. $4x^3 - 9x^2 + 8x$	none	(0.75, 2.625)	$m > 1.25$	(5, 315) (-3.5, -309.75)	218
264. $4x^3 + 12x + 14$	none	(0, 14)	$m > 12$	(-3, -130) (3, 158)	120
265. $3x^3 + 3x^2 + 12x - 20$	none	(-0.3333, -23.7778)	$m > 11$	(-3, -110) (2.3333, 62.4444)	75
266. $4x^3 + 2x^2 + 8x - 11$	none	(-0.1667, -12.2963)	$m > 7.6667$	(8, 2229) (-8.3333, -2253.5926)	808
267. $-2x^3 + 7x^2 - 9x$	none	(1.1667, -4.1481)	$m < -0.8333$	(-5, 470) (7.3333, -478.2963)	-229
268. $3x^3 - 2x^2 + 3x - 7$	none	(0.2222, -6.3992)	$m > 2.5556$	(6, 587) (-5.5556, -599.7984)	303
269. $-2x^3 - x^2 - 7x - 12$	none	(-0.1667, -10.8519)	$m < -6.8333$	(-5, 248) (4.6667, -269.7037)	-147
270. $x^3 + 12x + 18$	none	(0, 18)	$m > 12$	(5, 203) (-5, -167)	87
271. $x^3 + x^2 + 9x - 16$	none	(-0.3333, -18.9259)	$m > 8.6667$	(7, 439) (-7.6667, -476.8519)	170
272. $5x^3 + 9x^2 + 6x + 13$	none	(-0.6, 11.56)	$m > 0.6$	(-1, 11) (-0.2, 12.12)	3
273. $-2x^3 + 6x^2 - 8x + 8$	none	(1, 4)	$m < -2$	(3, -16) (-1, 24)	-26
274. $2x^3 - 3x^2 + 7x + 19$	none	(0.5, 22)	$m > 5.5$	(-1, 7) (2, 37)	19
275. $4x^3 - 3x^2 + 10x - 14$	none	(0.25, -11.625)	$m > 9.25$	(4, 234) (-3.5, -257.25)	178

equation	turning points	centre	gradient	points	gradient
276. $-2x^3 - 2x^2 - 8x - 13$	none	(-0.3333, -10.4815)	$m < -7.3333$	(0, -13) (-0.6667, -7.963)	-8
277. $5x^3 + x^2 + 7x - 18$	none	(-0.0667, -18.4637)	$m > 6.9333$	(5, 667) (-5.1333, -703.9274)	392
278. $-x^3 - x^2 - 12x - 18$	none	(-0.3333, -14.0741)	$m < -11.6667$	(0, -18) (-0.6667, -10.1481)	-12
279. $-x^3 - 2x^2 - 2x - 20$	none	(-0.6667, -19.2593)	$m < -0.6667$	(-1, -19) (-0.3333, -19.5185)	-1
280. $2x^3 - x^2 + 5x + 18$	none	(0.1667, 18.8148)	$m > 4.8333$	(6, 444) (-5.6667, -406.3704)	209
281. $3x^3 - 2x^2 + 11x + 17$	none	(0.2222, 19.3786)	$m > 10.5556$	(6, 659) (-5.5556, -620.2428)	311
282. $2x^3 - 5x^2 + 5x + 17$	none	(0.8333, 18.8519)	$m > 0.8333$	(5, 167) (-3.3333, -129.2963)	105
283. $-2x^3 + 7x^2 - 9x + 8$	none	(1.1667, 3.8519)	$m < -0.8333$	(-4, 284) (6.3333, -276.2963)	-161
284. $3x^3 - 4x^2 + 9x + 18$	none	(0.4444, 21.4733)	$m > 7.2222$	(-3, -126) (3.8889, 168.9465)	114
285. $5x^3 + 6x^2 + 4x - 10$	none	(-0.4, -10.96)	$m > 1.6$	(-4, -250) (3.2, 228.08)	196
286. $4x^3 - 4x^2 + 3x + 6$	none	(0.3333, 6.7037)	$m > 1.6667$	(9, 2625) (-8.3333, -2611.5926)	903
287. $3x^3 - 5x^2 + 12x - 4$	none	(0.5556, 1.6379)	$m > 9.2222$	(1, 6) (0.1111, -2.7243)	11
288. $4x^3 + 3x^2 + 6x + 8$	none	(-0.25, 6.625)	$m > 5.25$	(-3, -91) (2.5, 104.25)	96
289. $-2x^3 - 4x - 17$	none	(0, -17)	$m < -4$	(2, -41) (-2, 7)	-28
290. $-x^3 - 4x^2 - 6x - 20$	none	(-1.3333, -16.7407)	$m < -0.6667$	(3, -101) (-5.6667, 67.5185)	-57
291. $4x^3 + 2x^2 + 9x + 4$	none	(-0.1667, 2.537)	$m > 8.6667$	(4, 328) (-4.3333, -322.9259)	217
292. $4x^3 - 4x^2 + 3x - 1$	none	(0.3333, -0.2963)	$m > 1.6667$	(0, -1) (0.6667, 0.4074)	3
293. $5x^3 - 7x^2 + 5x + 15$	none	(0.4667, 16.317)	$m > 1.7333$	(6, 873) (-5.0667, -840.3659)	461
294. $3x^3 - 3x^2 + 2x + 10$	none	(0.3333, 10.4444)	$m > 1$	(1, 12) (-0.3333, 8.8889)	5
295. $x^3 - 4x^2 + 9x - 20$	none	(1.3333, -12.7407)	$m > 3.6667$	(1, -14) (1.6667, -11.4815)	4
296. $4x^3 + 2x^2 + 11x - 9$	none	(-0.1667, -10.7963)	$m > 10.6667$	(9, 3168) (-9.3333, -3189.5926)	1019
297. $3x^3 + 3x^2 + 10x - 3$	none	(-0.3333, -6.1111)	$m > 9$	(5, 497) (-5.6667, -509.2222)	265
298. $-x^3 - x^2 - 2x - 19$	none	(-0.3333, -18.4074)	$m < -1.6667$	(4, -107) (-4.6667, 70.1852)	-58
299. $-2x^3 - x^2 - 2x + 17$	none	(-0.1667, 17.3148)	$m < -1.8333$	(-1, 20) (0.6667, 14.6296)	-6
300. $5x^3 + 5x^2 + 8x + 20$	none	(-0.3333, 17.7037)	$m > 6.3333$	(-2, -16) (1.3333, 51.4074)	48