L2 Probability Revision #3

1. A store looks at the number of game consoles returned to it as faulty.

	Sold not returned	Sold then returned
Play-box	365	18
Game Station	402	21

   a) What was the probability a random console was returned?

   b) If a console was returned, what was the probability it was a Game Station?

   c) What is the relative risk that a Play-box will be returned relative to the Game Station? Interpret that number in terms of the games' reliability.

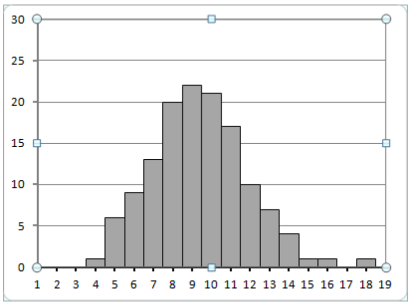
2. The shop sells games for the Game Station. 40% are "shooter" games, of which 55% are "first person shooter" games. Of the other games, only 25% are "first person".

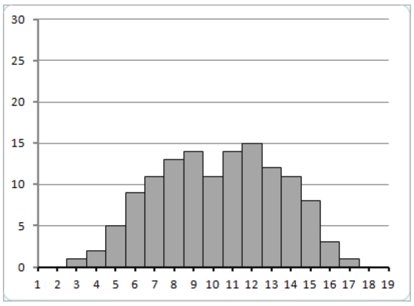
   a) If the shot sells 520 games in a week, how many would be "first person shooter"

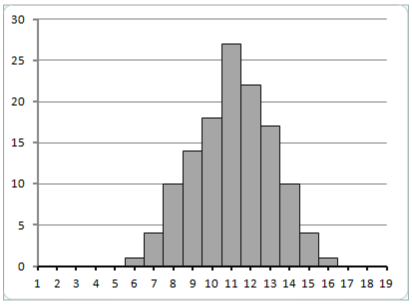
   b) What is the probability a random "first person" game is a "shooter" game?

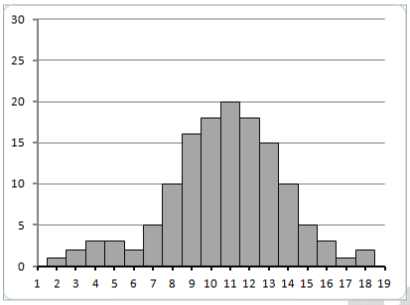
   c) If 119 third person shooter games are sold, how many third person non shooter games would you predict had sold?

3. Consider the experimental distributions shown, each of around 135 sampled values. How, if at all, do they deviate from what you might expect from a normal distribution?

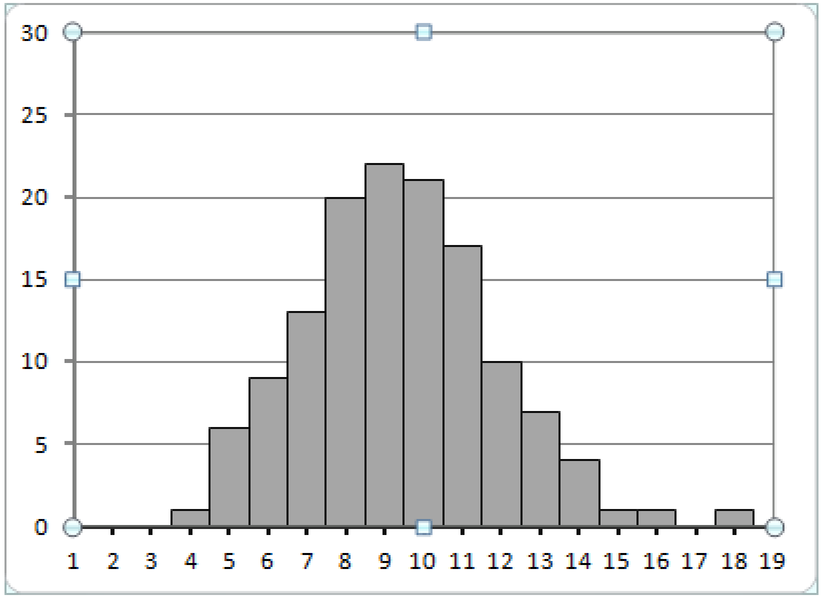
a)


b)


c)


d)


(*Bigger versions of these graphs are on the next page.*)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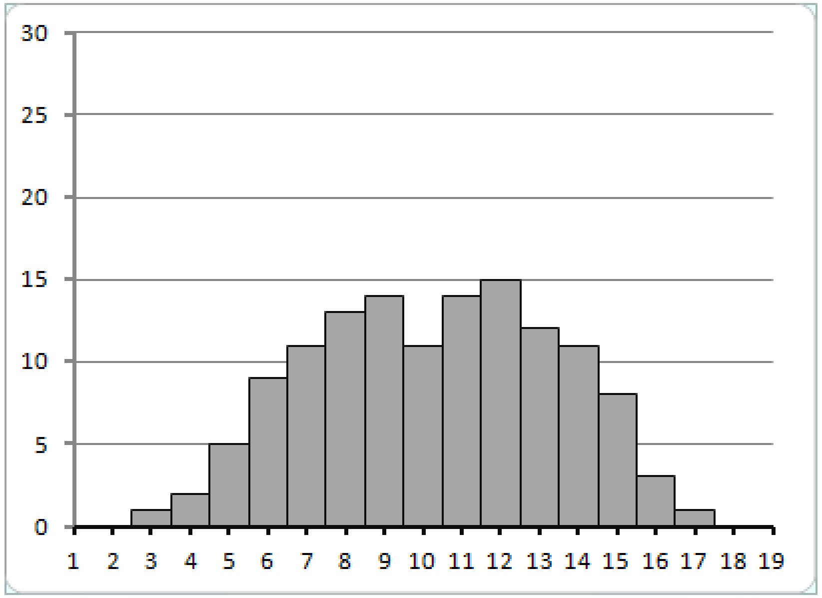
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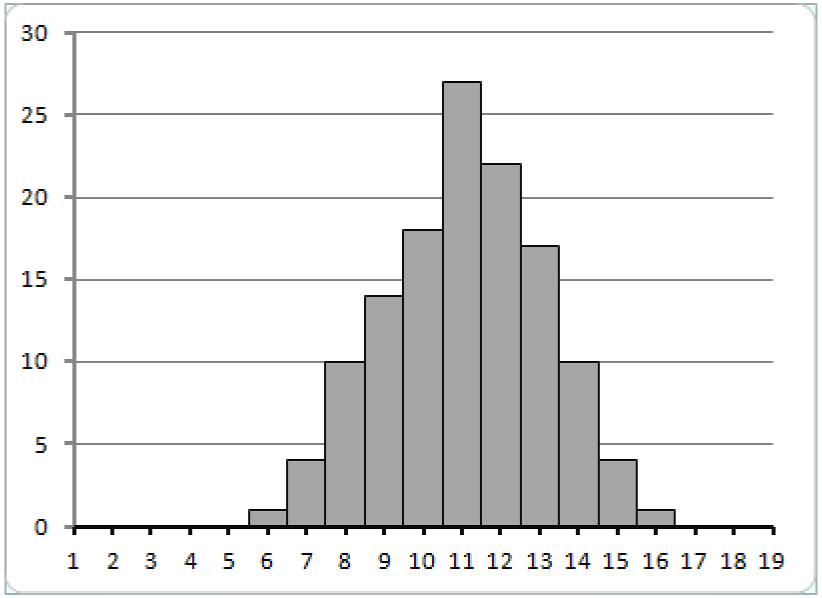
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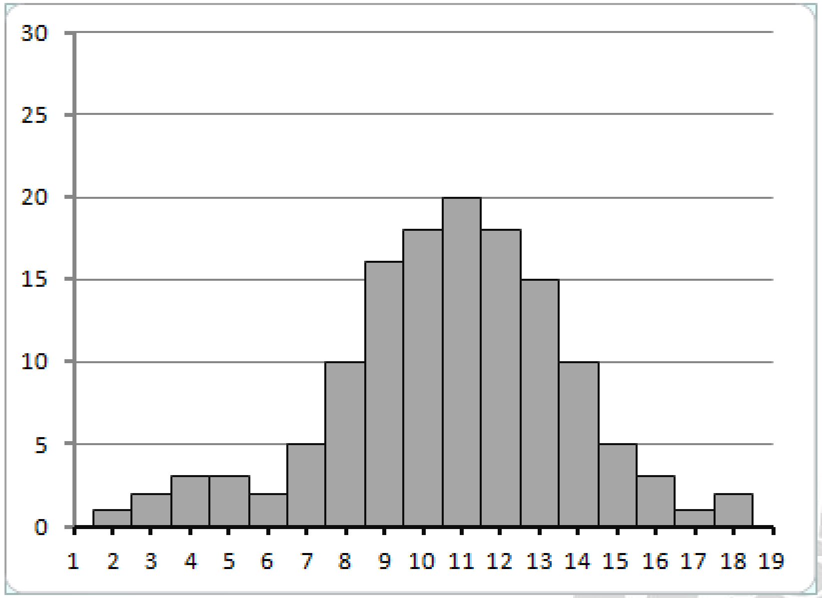
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Answers: L2 Probability Revision #3

1.

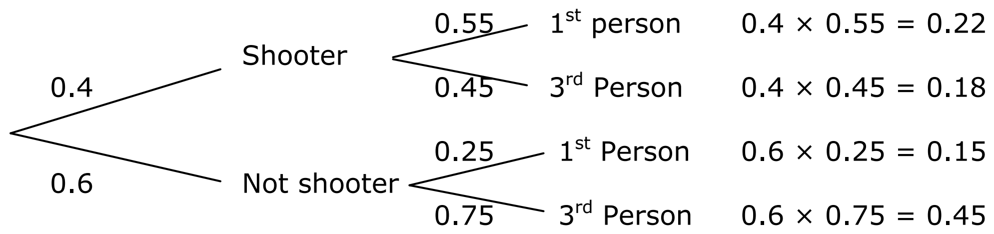
	Number sold	Number returned	
Play-box	365	18	383
Game Station	402	21	423
	767	39	806

a) 39 out of the 806 are returned = $^{39}/_{806}$ = **0.0484**

b) 21 out of the 39 returned are Game Stations = $^{21}/_{39}$ = **0.538**

c) Risk for Play-box = $^{18}/_{383}$ = 0.04700 Risk for G-S = $^{21}/_{423}$ = 0.04965
Relative risk for P-b = $^{0.04700}/_{0.04965}$ = **0.9467**
This means the **Play-box is less often faulty**.
It has approximately **5% less risk of being returned**.

2.



a) 0.4 × 0.55 × 520 = 115.648 = **116 games** (also accept = 115 or 116 games)

b) There are 0.22 + 0.15 = 0.37 first person games, of which 0.22 are shooter.
So P(shooter if first person) = $^{0.22}/_{0.37}$ = **0.595**

c) The ratio of 3rd person shooters to 3rd person non-shooters is 0.18 : 0.45.
0.18 : 0.45 = 1 : 2.5 so prediction is 2.5 × 119 = 297.5
Need whole number in context = **297 or 298 games**

3. a) Is not properly symmetric, with more values above the mode than below. It is skewed right, especially at the very high end, whereas a normal distribution should be symmetric about the central mode (allowing for some sample variation).

b) Symmetrical, but bimodal, which is not correct for normal distributions. It should have a clear central mode which is the median and mean. It is unlikely to be sample variation because even with the centre values a bit higher the overall shape is wrong, with a much too flat top to the bell.

c) Perhaps a bit too "pointy" or triangular but within typical limits of sample variation for a normal distribution of 135 samples.

d) There are far too many extreme values. The middle 95% suggests a standard deviation of 2.5 or so, but then 3σ should be 99% of all the values – and it is quite a lot more in this case. This looks too extreme to be likely due to sample variation.