L2 Probability Revision #2

1. The spider population on a tropical island is surveyed. The scientists found 18 different species, of which 5 were capable of giving a fatal bite. Six of the species had red markings, of which 4 were capable of giving a fatal bite.

   a) If a spider species is capable of giving a fatal bite, what is the probability that it has red markings?

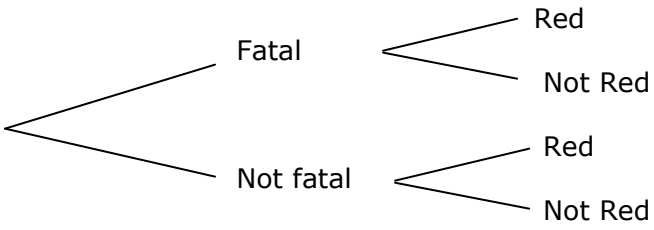
   b) Given that a spider species has red markings, what is the probability it has a potentially fatal bite?

   c) What is the relative risk that a red-marked species has a fatal bite, compared to non-red-marked ones?

2. Each species is not evenly distributed, however, as some are much more numerous. The survey counted 1800 spiders in total. 75 were found to have fatal bites.

   a) If 60% of the fatal bite spiders are over 4 cm long but only 4% of the non-fatal ones, what was the number over 4 cm long?

   80% of fatal spiders had red markings. Only 1.1% of non-fatal spiders had red markings.



   b) What is the probability of a random spider having red markings?

   c) What is the probability of a random red marked spider having a fatal bite?

3. The mean weight of a mature male Common Red Back is 3.6 grams, with a standard deviation of 0.7 grams.

   a) What is the probability a mature male Common Red Back weighs over 4 grams?

   b) If 80 mature male Common Red Backs were caught, how many would you expect to be over 5 grams?

   c) What is the interquartile range for the weights of mature male Common Red Backs?

Answers: L2 Probability Revision #2

1. The information given is in bold, which allows the rest to be calculated.

	Red	Not Red	
Fatal	**4**	1	**5**
Not-fatal	2	11	13
	6	12	**18**

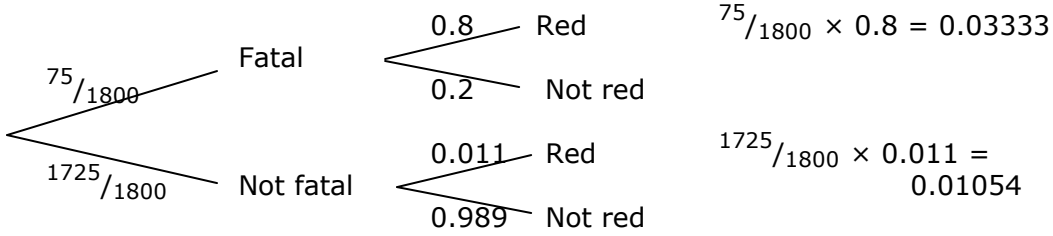
a) 4 out of the 5 fatal species are red = $^{4}/_{5}$ = **0.8**

b) 4 out of the 6 red species are fatal = $^{4}/_{6}$ = **0.666**

c) Risk for red marked = $^{4}/_{6}$ = 0.6666 Risk for non-red = $^{1}/_{12}$ = 0.8333
Relative risk for red marked species = $^{0.6666}/_{0.8333}$ = **8 times as high**

2.

a) 75 × 0.6 + 1725 × 0.04 × 1800 = 45 + 69 = **114 spiders**.



b) 0.03333 + 0.01054 = **0.04387**

c) 0.0333 × 1800 = 60 actual spiders in survey red-marked and fatal.
0.01054 × 1800 = 19 actual spiders in survey red-marked but not fatal
60 of the 79 fatal spiders are red marked. $^{60}/_{79}$ = **0.759**

3. a) Graphics normal distribution: Ncd: lower = -9999, upper = 4, σ = 0.7, μ = 3.6
P(w < 4) = **0.716**

b) Graphics normal distribution: Ncd: lower = 5, upper = 9999, σ = 0.7, μ = 3.6
P(w > 5) = 0.02275. Expected number for 80 is 80 × 0.02275 = 1.8.
Must round in this context = **2 spiders**

c) Graphics normal distribution: InvN: tail =middle, area = 0.5, σ = 0.7, μ = 3.6
IQR = **3.1278 to 4.0721 grams**
For old calculators with only left tail: area = 0.25, and then area = 0.75