NCEA Level 2 Mathematics (Homework)
22. Probability and Risk

Reading

Go and watch... (basic probability)

https://www.youtube.com/watch?v=fwD98HiQSJc

Go and watch... (relative risk)

https://www.youtube.com/watch?v=felIAwyaGFM

Questions

1. Watch the first video above. I have six tetrahedral dice. I roll them 1000 times. How many times should I expect to get six of the same number (six 1's, six 2's, six 3's, or six 4's) in a roll?

2. Watch the second video above. Consider the following two tables, which show data from two groups of New Zealander males over the age of fifty.

A	**Heart disease**	**None**	**Total**
Overweight	24	142	166
Not overwt	14	1706	184
Total	38	312	350

B	**Heart disease**	**None**	**Total**
Smoker	12	65	77
Non-smoker	9	84	93
Total	21	149	170

   (a) Discuss the following statement (is it correct? why?): The *absolute risk* of heart disease in group A was $38/350 = 0.109$, while the absolute risk of heart disease in group B was much greater: 0.124. Thus, smoking is more problematic than obesity when it comes to risks of heart disease.

   (b) **Important lesson:** it is not the *risk* that matters when comparing probabilities, it is the *relative risk*. In other words, we don't care about the probability that a person gets heart disease given that they are overweight — we care about whether this probability is higher than the probability that they get heart disease given that they are not overweight.

      i. Suppose a person from group A is known to be overweight. What is the risk that they develop a heart disease?

      ii. Suppose a person from group A is known to be not overweight. What is the risk that they develop a heart disease?

      iii. How much more likely is a person from group A to get heart disease if they are overweight?

   (c) *According to this study, a 50-year-old male is 60% more likely to develop heart disease if they are a smoker than if they are a non-smoker.* Does the evidence support this statement?