ML Excercise 2

3.7.6

Somebody tosses a fair coin and if the result is heads, you get nothing; otherwise, you get $5. How much would you pay to play this game? What if the win is $500 instead of $5?

I would be willing to pay the same amount (or less) as the expected value of the bet, being $2.5

Same for $500 - which would be $250. *Although only with repeated trials.*

3.7.8

Generalize the confidence and support formulas for basket analysis to calculate k-dependencies, namely, $P(Y|X_1, \ldots, X_k)$.

It would essentially stay the same, simply adding the joint probability for $X_1 .. X_k$ to the exsisting formulas.

Support: $P(X_1, \ldots X_k, Y)$

Confidence: $\frac{P(X_1, \ldots X_k, Y)}{P(X_1, \ldots X_k)}$

3.7.9

Show that as we move an item from the antecedent to the consequent, confidence can never increase: confidence(ABC → D) ≥ confidence(AB → CD).

By looking at the defination of the *confidence* association rule

$$\text{confidence}(X \to Y) = \frac{P(X, Y)}{P(X)}$$

we see that the that the numerator, being the joint probability of X and Y, will stay the same, while the denomenator $P(X)$ can only increase as X "contains" fewer items and thus is more probable.