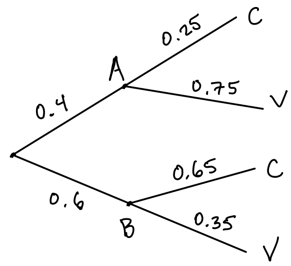
Copy B

1. (a) By the Law of Total Probability,



$$P(C) = P(C \text{ and } A) + P(C \text{ and } B)$$
$$= P(A)\,P(C|A) + P(B)\,P(C|B)$$
$$= (0.4)(0.25) + (0.6)(0.65)$$
$$= 0.49$$

(b) We seek $P(B|C)$ which, by Bayes' Rule, is

$$P(B|C) = \frac{P(C|B)\,P(B)}{P(C)} = \frac{(0.6)(0.65)}{0.49} = \underline{0.796}$$

2. Options (ii), (iv) and (v) are sensitive to outliers.

3. (a) both variables are quantitative: III

(b) has a categorical explanatory variable and a quantitative response: II

(c) both variables are categorical: I

4. (a) <u>None</u>. Only in setting (a), where both variables are quantitative, is correlation meaningful. But given the nature of the variables, one would expect a negative correlation.

(b) Setting (a) is the easiest to make into an experiment, as exercise regimen is something one can impose on participants.

Setting (b) is plausible, but more difficult to impose explanatory values.

Setting (c) cannot be implemented as an experiment.

5. (a) iv (b) i (c) iii (d) ii

6. (a) It is bimodal and symmetric (mostly)

(b) median is smaller (lesser)

(c) range (approx.): $21.5 - 5.5 = 16$

5-number summary (approx.): 5.5, 8, 10, 13, 21.5

IQR (approx): $13 - 8 = 5$

7. Options (i), (iv) and (vi) are true

8. (a) names(books)

(b) nrow(books)

(c) These variables are categorical: Status (?), inLocalLibrary, haveRead, genre

(d) tally(~genre, data = books)

(e) Generally, it means when you know the value of one variable, you can make refined estimates/guesses about the other.

9. (a) dbinom(10, 25, 1/4)

(b) 1 - pbinom(9, 25, 1/3)

10. (a)

$A = \{1, 2, 3, 4, 5\}$

$B = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$

$C = \{3, 6, 9, 12, 15, 18\}$

$D = \{10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$

$$\boxed{P(A) = \frac{5}{20} \quad P(C) = \frac{6}{20} \quad P(B) = \frac{10}{20} \quad P(D) = \frac{11}{20}}$$

(b) B and D $= B \cap D = \{10, 12, 14, 16, 18, 20\}$, so $P(B \cap D) = \frac{6}{20}$

(c) A or C $= A \cup C = \{1, 2, 3, 4, 5, 6, 9, 12, 15, 18\}$, so $P(A \cup C) = \frac{10}{20}$

(d) Since $A \cap D = \{\}$, A, D are disjoint events

(e) $P(B \mid C) = \dfrac{P(B \text{ and } C)}{P(C)} = \dfrac{3/20}{6/20} = \dfrac{1}{2}$

(f) B, C are independent, since $P(B) = \frac{1}{2} = P(B \mid C)$.

11. (a) $P(X \leq 5) = P(X = 3) + P(X = 5) = 0.3 + 0.1 = 0.4$

(b) $P(X = 11) = 1 - (0.3 + 0.1 + 0.35) = 0.25$

(c) $E(X^2) = \sum_x x^2 P(X = x) = (3)^2(0.3) + (5)^2(0.1) + (7)^2(0.35) + (11)^2(0.25)$

$= \underline{52.6}$