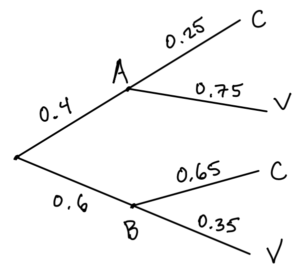
Copy B

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. (a) Exp (b) Norm (c) Binom (d) Unif

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

$$= \underline{52.6}$$

4. (a) names(books)

(b) nrow(books)

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

(d) Most obviously discrete: yearPublished, numPages

(e) mean(~ pages, data = books)

5. (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 $P(B) = \frac{1}{2} = P(B \mid C)$.

6. (a) When $X \sim Exp(\lambda)$, $\mu_X = \frac{1}{\lambda}$. So, $\lambda = \frac{1}{210}$

(b) $P(X \geq 3000) = 1 - P(X < 3000) = \boxed{1 - \text{pexp}(3000, \ 1/210)}$

Or, $P(X \geq 3000) = \int_{3000}^{\infty} f(x)\,dx = \int_{3000}^{\infty} \frac{1}{210} e^{-x/210}\,dx$

(c) qexp(0.75, 1/210)

7. (a) $a = 5$, $b = 18$ and

$E(X) = \frac{1}{2}(a+b) = \underline{11.5}$

$Var(X) = \frac{1}{12}(b-a)^2 = \frac{169}{12} = \underline{14.083}$

(b) 68% is the number for the blank.

"within 1 sd of the mean" corresponds to the interval

$11.5 \pm \sqrt{14.083}$, or $(7.747, \ 15.253)$

So, $\boxed{\text{punif}(15.253, 5, 18) - \text{punif}(7.747, 5, 18)}$

or $\boxed{\int_{7.747}^{15.253} \frac{1}{13}\,dx} = \frac{1}{13} x \Big|_{7.747}^{15.253} = \underline{0.577}$

8. $E(R+G) = E(R) + E(G) = 168 + 149 = \underline{317}$

$Var(R+G) = Var(R) + Var(G) = \sigma_R^2 + \sigma_G^2 = 11.3^2 + 15.2^2 = 358.73$

$\Rightarrow SD(R+G) = \sqrt{358.73} = \underline{18.94}$