

Homework due March 18

Assigned exercises:

Ch.3, OpenStax book, pg. 223-230, ex. 85(c-f), 89, 90, 92, 101-108, 112, 114, 115.

And from linked supplement: 18, 24, 35, 36. (total=19 numbered exercises)

Graded exercises: From Ch.3, OpenStax book: 90, 102-104 (as one exercise), 114 and 115 (as one exercise). From linked supplement: 18, 24.

Total (maximum) possible points = 20.

3 pt for each of 5 graded problem sets, plus 5 for completion of the rest.

-0.5 pt for each (ungraded) missing problem; if a graded problem is missing, student loses the points allotted to it.

Exercises from Ch.3, OpenStax

(90) (a) $P(C \text{ and } D) = P(C) \times P(D|C)$ OR $P(D) \times P(C|D)$
 $= 0.5 \times 0.6$ $= 0.3$ (Answer)

(c) No, C and D are not independent, because $P(C) = 0.4$ and $P(C|D) = 0.6$. If they were independent, then those probabilities would be equal.

(e) $P(D|C) = P(C \text{ and } D)/P(C) = 0.3/0.4$ $= 0.75$ (Answer)

(b) and (d) are not graded, but here are the answers:

(b) C and D are not mutually exclusive. If they were, then $P(C \text{ and } D)$ would be 0.

(d) $P(C \text{ or } D) = P(C) + P(D) - P(C \text{ and } D) = 0.4 + 0.5 - 0.3 = 0.6$

Grade: 1 pt. each for (a), (c) and (e).

For each case: 0.5pt = correct answer; 0.5 pt = show some step(s) or reason(s)

(102-104)(102) From the table, there are 34 senators up for reelection in Nov 2016, out of a total of 67 senators. Thus, the probability is: $34/67 = 0.5075$

(103) There are 10 Democrats who are up for reelection in Nov 2016. Thus, the probability of Democrat and up for reelection in Nov 2016 is: $10/67 = 0.1493$

(104) Number who are Republican or up for reelection in Nov 2014 = $20 + 13 + 24 = 57$. Thus, the answer is: $57/67 = 0.8507$

Grade: 1 pt. each for 102, 103 and 104.

For each exercise, must show calculation step, or write answer as fraction with clear/correct numerator & denominator.

(114-115) Note: Although a tree diagram has been provided for these exercises, I couldn't tell why/how it adds value here, since the two depicted events are independent. Typically, tree diagrams are most useful when one event has disjoint outcomes, followed by an event whose probabilities are conditional upon the first event's outcome.

(114) Since the coin toss and bead selection are independent, we can simply multiply.

$$P(\text{tossing head and red bead}) = P(\text{head}) \times P(\text{red}) = \frac{2}{3} \times \frac{3}{12} = \frac{1}{6} = \frac{6}{36}$$

(115) Since there are 5 blue beads out of 12, $P(\text{blue}) = \frac{5}{12} = \frac{15}{36}$

Note that the outcome of the coin toss is completely irrelevant here.

Grade: 1.5 pt for each of (114)-(115).
For each: 1pt = correct answer; 0.5 pt = show some step(s) or reason(s)

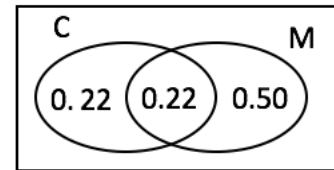
Exercises from linked supplement

(18) Can use a contingency table or Venn diagram here, or carefully apply relevant formulas.

The Venn diagram shows disjoint/ non-overlapping probabilities, with M=Married, C=College grad.

Information given: $P(M)=0.72$, $P(C)=0.44$.

The intersection region is 0.22, since half the college grads are married. That leaves $0.44 - 0.22 = 0.22$, and $0.72 - 0.22 = 0.5$ for the other regions shown.



(a) $P(\text{neither M nor C}) = 1 - P(M \text{ or } C) = 1 - (0.22 + 0.22 + 0.5) = 0.06$

(b) From the Venn diagram: $P(M \text{ but not } C) = 0.5$

(c) From part (a), or Venn diagram: $P(M \text{ or } C) = 0.94$

Grade: Only (a) and (b) are graded.
1pt each for correct answers to (a) and (b). Answers expressed in % are okay.
1pt for showing reasoning or steps for those correct answers.

(24) (a) (i) $P(\text{favors stronger enforcement}) = 0.30 + 0.22 + 0.16 = 0.68$

(ii) $P(\text{favors stronger enforcement} \mid \text{Republican}) = \frac{0.30}{0.30 + 0.04 + 0.03} = \frac{3}{37} = 0.8108$

(iii) $P(\text{Democrat} \mid \text{favors stronger enforcement}) = \frac{0.22}{0.68} = \frac{11}{34} = 0.3235$

(b) Not graded.

Grade: (i)=(ii)=(iii)=1 point each.
For each: 0.5 pt = write correct interpretation of the probability in question.
0.5 pt = find correct answer.