Math 1031 College Algebra and Probability
Self-Quiz 4 Solutions

December 7, 2010

Name:

This quiz is designed to give you practice in an exam-like setting before our fourth midterm on Friday.

1. Suppose that a treat bag of 8 candy bars contains 2 Snickers and 6 Butterfingers. George gets to pick 3 candy bars from the bag. Find the probability that he picks 1 Snickers and 2 Butterfingers.

Solution:

\[ n(S) = C(8, 3) = 56 \]
\[ n(E) = C(2, 1)C(6, 2) = 30 \]
\[ P(E) = \frac{30}{56} = \frac{15}{28} \]

2. A poll asked the citizens of Townsville whether they had a positive or negative view of the mayor. 80% of the citizens selected "positive", and the other 20% selected "negative".

(a) If 5 citizens of Townsville are randomly selected, what is the probability that 2 of them view the mayor negatively? Express your solution as a percentage, and round to the nearest percent.

Solution: \[ P(3) = C(5, 3)(.8)^3(.2)^2 \approx .20 = 20\% \]

(b) If 15 citizens of Townsville are randomly selected, what is the probability that at least 13 of them will have a favorable view of the mayor? Express your solution as a percentage, and round to the nearest percent.

Solution:

\[ P(13) = C(15, 13)(.8)^{13}(.2)^2 \approx .23 \]
\[ P(14) = C(15, 14)(.8)^{14}(.2)^1 \approx .13 \]
\[ P(15) = C(15, 15)(.8)^{15}(.2)^0 \approx .04 \]
\[ P(\geq 13) = P(13) + P(14) + P(15) \approx .23 + .13 + .04 = .4 \]
The probability is about 40\%. 
3. A contractor bids on a project. There is a probability of 72% that he can show a profit $40,000 and a probability of 38% that he will absorb a loss of $10,000. What is his mathematical expectation?

**Solution:** $E_v = (.72)(40,000) + (.38)(-10,000) = 25,000$, so the expectation is $25,000$

4. An ice cream store has two special flavors this month, butterscotch and cinnamon. Today 30% of customers ordered butterscotch ice cream, 20% ordered cinnamon ice cream, and 10% ordered both.

(a) What is the probability that a (random) customer ordered one of the special flavors, butterscotch or cinnamon?

**Solution:** $P(B \cup C) = P(B) + P(C) - P(B \cap C) = .3 + .2 - .1 = .4$

(b) What is the probability that a (random) customer got cinnamon ice cream, given that they also got butterscotch ice cream?

**Solution:** $P(C|B) = \frac{P(C \cap B)}{P(B)} = \frac{.1}{.3} = \frac{1}{3}$

(c) Let the $E$ be the event that a customer chooses butterscotch, and let $F$ be the event that a customer chooses cinnamon. Are the events $E$ and $F$ dependent or independent? Support your solution.

**Solution:** If the events are independent, then $P(E \cap F) = P(E)P(F)$. We have $P(E \cap F) = .1$ and $P(E)P(F) = (.3)(.2) = .06$. The equation does not hold, so the events are dependent.