AP Statistics   Name: ___________________________

Ch 14-15 Test Review

1. Many fire stations handle emergency calls for medical assistance as well as calls requesting fire-fighting equipment. A particular station says that the probability that an incoming call is for medical assistance is .85.

a. What is the probability that a call is not for medical assistance?

$P(\text{med}') = 1 - .85 = \boxed{.15}$

b. Assuming that successive calls are independent, what is the probability that both of two successive calls will be for medical assistance?

$P(2\text{ med}) = (.85)^2 = \boxed{.7225}$

c. What is the probability that three consecutive calls are not for medical assistance?

$P(3\text{ med}'\text{ calls}) = (.15)^3 = \boxed{.0034}$

d. What is the probability that of the next 10 calls, at least one is for medical assistance?

$1 - P(\text{none of 10 are med}) = 1 - (.15)^{10} = \boxed{.999}$

2. A slot machine has three wheels that spin independently. Each wheel has 10 equally likely symbols: 4 bars, 3 lemons, 2 cherries, and a bell. Determine the following probabilities of getting:

a) 3 lemons.

$P(3\text{ lemons}) = (.3)^2 = \boxed{.027}$

b) no fruit symbols.

$P(\text{bar} \cup \text{bell})^3 = (.5)^3 = \boxed{.125}$

c) 3 bells (a jackpot).

$P(3\text{ bells}) = (.1)^3 = \boxed{.001}$

d) no bells.

$P(\text{no bells}) = (.9)^3 = \boxed{.729}$

e) at least one bar (an automatic lose).

$1 - P(\text{no bars}) = 1 - (.6)^3 = \boxed{.784}$

Call a household prosperous if its income exceeds $100,000. Call the household educated if the householder completed college. Select an American household at random, and let A be the event that the selected household is prosperous and B the event that the household is educated. According to the Census Bureau, P(A) = 0.134, P(B) = 0.254, and P(A and B) = 0.080.

a. What is the probability that the household selected is prosperous or educated, P(A or B)?

$P(A \cup B) = .134 + .254 - .080 = \boxed{.308}$

b. Are being prosperous and educated independent of each other? Explain.

No! $P(A) \cdot P(B) \neq P(A \cap B) \rightarrow (.134)(.254) \neq .080$

New spark plugs have just been installed in a small airplane with a four-cylinder engine, one spark plug per cylinder. For each spark plug, the probability that it is defective and will fail during its first 20 minutes of flight is 1/10,000, independent of the other spark plugs.

a. For any given spark plug, what is the probability that it will not fail during the first 20 minutes of flight?

$P(\text{not fail}) = 1 - P(\text{fail}) = \boxed{.999}$

b. What is the probability that none of the four spark plugs will fail during the first 20 minutes of flight?

$P(\text{none fail}) = (.999)^4 = \boxed{.9996}$

c. What is the probability that at least one of the spark plugs will fail?

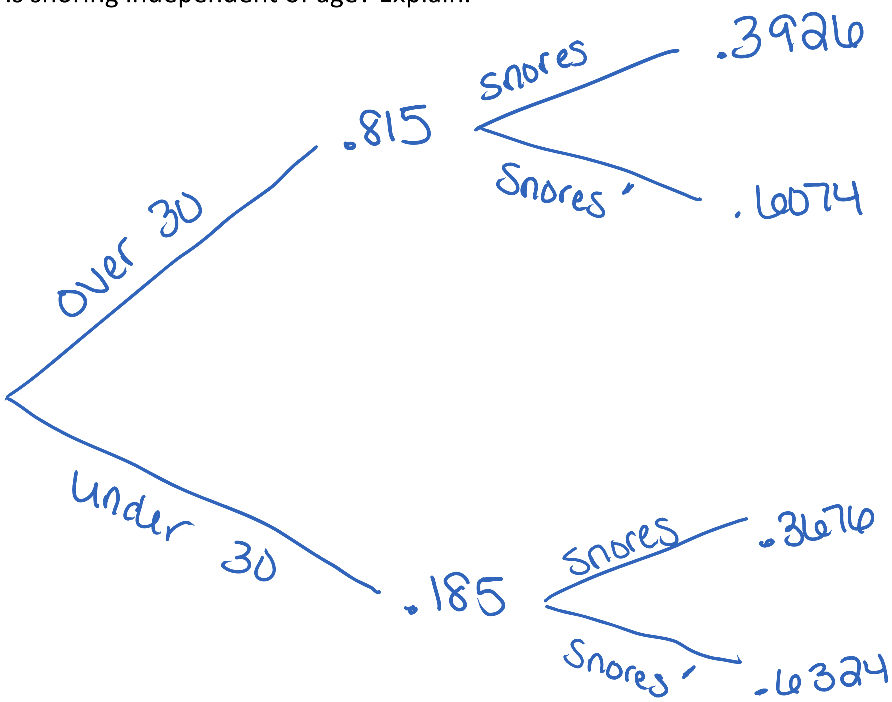
$1 - P(\text{none}) = 1 - .9996 = \boxed{.0004}$

After surveying 995 adults, 81.5% of who were over 30, the National Sleep Foundation reported that 38.8% of all adults snored. Of the respondents, 32% were snorers over the age of 30.

a. What percent of the respondents were under 30 and did not snore?

b. Is snoring independent of age? Explain.

$P(\text{over } 30 \cap \text{snores}) = .32$



$.388 - .32$

$P(\text{under } 30 \cap \text{snores}) = .068$

a. $P(\text{under } 30 \cap \text{snores}') = (.185)(.6324) = .117$

b. $P(\text{over } 30) = .815 \quad P(\text{snores}) = .388$

$P(\text{over } 30 \cap \text{snores}) = (.815)(.388) = .3162$