Name:_____

AP stats Assign 6.1 Independence and Non Mutually Exclusive Events

1. What does it mean that two events are independent?

2. How do you check if two events are independent?

3. What does it mean that two events are mutually exclusive?

4. If the probability of event "A" $P(A)=0.2$ and the probability of event "B" is $P(B)=0.4$, what is the probability of "A" and "B" happening together , $P(A\cap B)$, equal to if "A" and "B" are independent?

5. Using the information from above, what is the probability of $P(A\cap B)$ if "A" and "B" are mutually exclusive?

6. What is the difference between "A or B" vs "A and B"? Explain this using a Venn diagram

7. If "A" and "B" are independent events, what is the probability of $P(A\cup B)$?

8. If the probability of event "A" $P(A)=0.2$ and the probability of event "B" is $P(B)=0.4$, what is the probability of either "A"OR "B" happening , $P(A\cup B)$, equal to if "A" and "B" are independent events?

9. If two events are mutually exclusive, do they have to be independent or dependent? Explain:

10. What does it mean when $P(A)\times P(B)>P(A\cap B)$

11. What does it mean when $P(A) \times P(B) < P(A \cap B)$

12. Given that $P(A) = 0.09$, $P(B) = 0.16$, and $P(A \cap B) = 0.21$, find the probability of the following by drawing a VENN diagram.

a) $P(\overline{A}) =$

b) $P(\overline{B}) =$

c) $P(A \cup B) =$

d) $P(\overline{A \cup B}) =$

e) $P(\overline{A} \cup \overline{B}) =$

f) $P(\overline{A} \cap \overline{B}) =$

g) $P(A \cap \overline{B})$

h) $P(\overline{A \cap B}) =$

13. The probability of an accident occurring at the intersection of Canada Way and Willingdon on any particular day is 0.0825. The probability of the skytrain shut down in Burnaby is 0.0095. If the probability of having an accident at Canada Way/Willingdon AND the skytrain shutting down in Burnaby is 0.0008375, are these two events independent? Explain:

14. Suppose a person was having two surgeries performed at the same time by different operating teams. Assume (unrealistically) that the two operations are independent. If the chances of success for surgery A are 85%, and the chances of success for surgery B are 90%, what are the chances that both will fail?

15. Abby, Barbara, Carla, Dan, and Ennis work in a firm's public relations office. Their employer

must choose two of them to attend a conference in Chicago. To avoid unfairness, the choice will be made by drawing two names from a hat. (This is a sample size of 2.)

(a) Write down all possible choices of two of the five names. For convenience, you can simply use the first letter of their names.

(b) The random drawing makes all choices equally likely. What is the probability of each choice?

(c) What is the probability that neither of the two men (Dan and Ennis) is chosen?

3. In a statistics class there are 18 juniors and 10 seniors; 6 of the seniors are females, and 12 of the juniors are males. If a student is selected at random, find the probability of selecting

(a) a junior or a female

(b) a senior or a female

(c) not a junior male

4. Consolidated Builders has bid on two large construction contracts. The company president believes that the probability of winning the first contract (event A) is 0.6, that the probability of winning a second (event B) is 0.4, and that the probability of winning both jobs is 0.2.

(a) What is the probability of the event {A or B} that Consolidated will win at least one of the jobs?

(b) Draw a Venn diagram that shows the relation between the events A and B in (a).

5. Write each of the following events in terms of A, B, A^c, and B^c. Indicate these events on the Venn diagram, and use the information above to calculate the probability of each.

(a) Consolidated wins both jobs.

(b) Consolidated wins the first job but not the second.

(c) Consolidated does not win the first job but does win the second.

(d) Consolidated does not win either job.

6. In building new homes, a contractor finds that the probability of a homebuyer selecting a two-car garage is 0.70 and of selecting a one-car garage is 0.20. (Note that the builder will not build a three-car or larger garage.)

(a) What is the probability that the buyer will select either a one-car or a two-car garage?

(b) Find the probability that the buyer will select no garage.

(c) Find the probability that the buyer will not want a two-car garage.