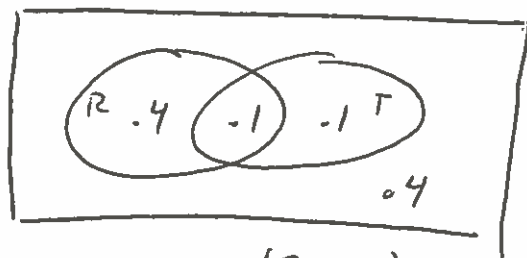Name:_____

Quick Hit 14

1. The weather forecast for tomorrow states that there is a 50% chance of rain, a 20% chance of tornadoes, and a 10% chance of tornadoes without the rain. Letting R be the event "it will rain tomorrow" and T be the event "there will be tornadoes tomorrow," are R and T independent? (*Hint:* make a Venn Diagram to help compute the probabilities.)

$$R \quad .4 \quad (.1) \quad .1 \quad T$$
$$.4$$

$$p(R \mid T) = \frac{p(R \cap T)}{p(T)} = \frac{.1}{.2} = .5$$

$$p(R) = .4 + .1 = .5$$

$$p(R \mid T) = p(R), \text{ so the events are independent}$$

2. You are dealt a 5-card hand from a standard deck of cards. What is the probability that you are dealt exactly 2 hearts given that you are dealt exactly 3 red cards?

$$H = \{x \mid x \text{ is a hand with exactly 2 hearts}\}$$
$$R = \{x \mid x \text{ is a hand with exactly 3 red cards}\}$$

$$n(H \cap R) = \underbrace{_{13}C_2}_{\text{hearts}} \quad \underbrace{_{13}C_1}_{\text{red, not heart}} \quad \underbrace{_{26}C_2}_{\text{other}} = 329550$$

$$n(R) = \underbrace{_{26}C_2}_{\text{red}} \quad \underbrace{_{26}C_3}_{\text{not}} = 845000$$

$$p(H \mid R) = \frac{329550}{845000} = .39$$