

KEY

NAME _____

Honor _____

Exam 1

Answer each question; the test is worth a total of 14 points. **Show your work**, even if you do most of the answer on a calculator you need to set up the problem and show me what you were using to get that answer. **Circle your final answer**. The honor code is in affect.

1. (2 pt) In the game of blackjack a player is dealt 2 cards from a deck of 52 cards. If the order in which a player receive his/her cards does not matter how many possible card combinations could be dealt?

$$r = 2$$

$$n = 52$$

no order \Rightarrow order does not matter

$$\binom{52}{2} = \frac{52!}{2!(52-50)!} = 1326$$

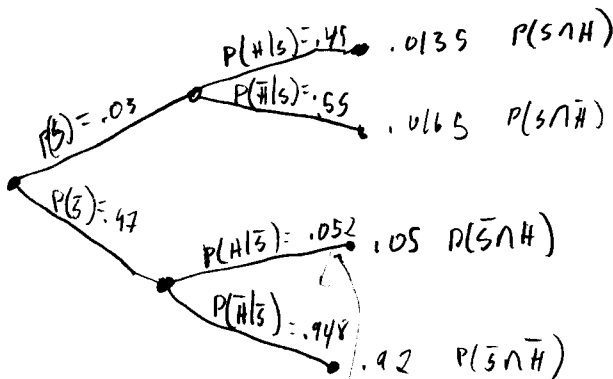
2. A drug company introduces a new drug. It is known that 3% of patients who take this drug will report side effect. Of those patients that report side effects 45% of them will end up in the hospital. The company also knows that the probability a patient does not report ~~any~~ side effects and ends up in the hospital is 5%.

$$P(S) = .03$$

$$P(H|S) = .45$$

$$P(\bar{S} \cap H) = .05$$

- a. (2 pts) Draw and completely fill in the tree, table, or both to represent this problem. (you are not required to do both for full credit)



	S	\bar{S}	
H	.0135	.05	.0635
\bar{H}	.0165	.92	.9365
	.03	.97	1

$$P(H|\bar{S}) = \frac{P(\bar{S} \cap H)}{P(\bar{S})} = \frac{.05}{.97} = .0515$$

- b. (2 pts) What is the probability that a person taking the drug will end up in the hospital?

$$P(H) = .0635$$

from table

- c. (1 pt) Are reporting side effects and going to the hospital independent events? (to receive full credit you must give a reason why)

$$P(H) = .0635 \quad P(H|S) = .45$$

$P(H) \neq P(H|S)$ so independent

~~$P(S) = .02$~~ ~~$P(S|H)$~~ not enough info

- d. (2 pts) If you observe that a person that has taken this drug ends up in the hospital, what is the probability that they had reported side effects?

$$P(S|H) = \frac{P(S \cap H)}{P(H)} = \frac{.0135}{.0135 + .05} = .212598$$

- e. (2 pts) The drug company has a promotion to sell their new drug. If a patient that has taken their drug ends up in the hospital (whether they reported side effects or not) the company would pay all their hospital bills. If a hospital bill is \$5000 (drug company get -\$5000 profit) and the profit off of the drug when a patient does not go the hospital is \$500, what is the expected profit of the drug company?

$$\bar{\pi} = -5000 \quad \text{with a } P(H) = .0635$$

$$\pi = 500 \quad \text{with a } P(\bar{H}) = .9365$$

$$E(\pi) = (-5000)(.0635) + (500)(.9365) =$$

$$-317.5 + 468.25 = \boxed{150.75}$$

3. A survey of 10,000 men found that men exercise for an average of 19 minutes a day with a standard deviation of 9 minutes.

- a. (1 pt) At least how many of the men in the sample would have exercised between 1 and 28 minutes a day? (you don't know anything about the shape of the distribution)

$$n = 10,000$$

$$\bar{x} = 19$$

$$s = 9$$

2 s.d. around 19 is 1 and 37

so according to Tschernycheff
at least

$(1 - \frac{1}{2^2})$ OR $\frac{3}{4}$ of the obs will fall between
1 and 37 - ~~so~~ OR

7500

- b. (2 pts) The same survey asked 10,000 women how many minutes they exercised a day. It showed the women exercise an average of 11 minutes a day with a standard deviation of 8 minutes. Is men's or women's exercising more variable? (show why)

$$n = 10,000$$

$$\bar{x}_w = 11$$

$$s_w = 8$$

$$CV_w = \left(\frac{8}{11}\right) 100 = 72.7\%$$

$$CV_m = \left(\frac{9}{19}\right) 100 = 47.37\%$$

the women are more variable in
their exercising