## EXPECTE BACE

Name Key

Thanks to you, the betting office has realized some horses are more likely to win, so they will pay betters less if those horses win. (Way to go, party pooper!) Here are the new payouts.

E	Horse # 1 2 Payout \$200 \$70 \$	3 4 5 6 7 8 9 10 11 12 \$35 \$22 \$16 \$14 \$10 \$14 \$16 \$22 \$35 \$70										
		\$35	\$22	5 \$16	6 \$14	7 \$10	8 \$14	9 \$16	10	11	12	

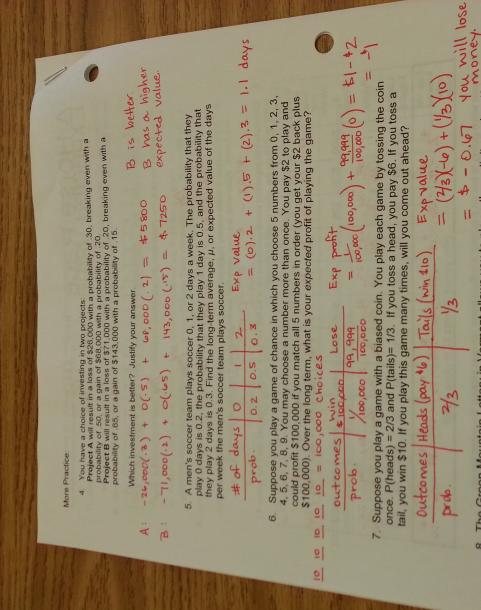
- 1. If you bet on horse 4, the theoretical probability you will win is 3/30 (refer to #10 on the other sheet).
  - a. So there is a 3/3/2 probability you'll win \$22, and a 3/3/2 probability you'll win \$0. What are your expected earnings if you bet on horse 4?
  - b. But of course it costs money to place a bet! At this racetrack, it costs \$2 to place a bet on any horse. Now what are your expected earnings/losses if you bet on horse 4?

Calculate the expected earnings/losses on a \$2 bet for each horse. (You just did it for horse 4.)

Refer to #10 on the other sheet for P(win).												
Horse	# 1	1 2	3	1 4	5	6	7	8	9 1	10	11	12
P(win #10 on other sheet		1/36	7/36	3/36	-	5/36	6/36	5/	4/36	3/36	2/36	/36
Winnin g Payout	\$200	\$70	\$35	\$22	\$16	\$14	\$10	\$14	\$16	\$22	\$35	\$70
P(lose)	1	35/36	34 36	33	36	31 36	30/36	31 36		33/36	34	36
Losing Payout	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
on this	-42 -	06	06		22			06		17	406	406
horse (Remember, it costs \$2 to place a bet!)												

- 3. If you were going to bet on this race a million times (always picking the same horse)...
  - a. Which horse is the best (or least bad) choice? There may be more than one. 2,3,6,8,11,12
  - b. Which horse is the worst choice? There may be more than one.
- c. Should you go through with your plan to bet a million times? Explain mathematically in two or three full sentences.

No. The expected value for each horse is negative which means you will lose money in the long run with each horse.



8. The Green Mountain Lottery in Vermont allows you to play a three digit number (0 to 9) and repeats are allowed. If you win, the prize is \$500. What is the expected value of your winnings?

10 = 1,000 thoices

Exp. Value

10 10 10 = 1,000 choices Exp. value outcomes  $\frac{10}{4500}$  Lose =  $\frac{100}{100}$  (500) +  $\frac{999}{1000}$  (0)

 $E(x) = O(\frac{1}{8}) + I(\frac{3}{8}) + 2(\frac{3}{8}) + 3(\frac{1}{8})$ Suppose a fair coin is tossed three times and we let x= number of heads. Find outcomes 0