HM3 HW – EXPECTED VALUE AND FAIR PRICE

Name Key 2016

1. Explain the meaning of expected value in your own words:

After an infinite number of trials, it is your long term mean

2. You are playing a game where you roll a dice. If it lands on 3, you win $15. If it lands on anything else, you lose $1. What is the expected value of the game?

$\frac{1}{6}(\$15) + \frac{5}{6}(-\$1) = \$1.67$

3. Use the table to find the expected value:

OUTCOME VALUE	450	-100	-50
PROBABILITY	0.2	0.4	0.4

$0.2(450) + 0.4(-100) + 0.4(-50)$

30

4. You are playing a video game where there is a 30% chance you win 50 points, a 50% chance you lose 20 points, and a 20% chance you don't win or lose any points at all. What is the expected point value after playing the game?

$.3(50) + .5(-20) + .2(0) = 5$

5. You go to the mall to buy a new shirt. Of the shirts at Belk, 30% cost $30, 25% cost $44.99, 20% cost $25, 15% cost $40, and 10% cost $55.99. How much can you expect to pay for a shirt at Belk?

$.3(30) + .25(44.99) + .2(25) + .15(40) + .10(55.99)$

$= \$36.85$

6. You are playing a game at the fair where you kick a soccer ball into a goal. If you score a goal, you win $15. If you miss, you lose $4. There is a 0.3 probability that you will score. What is the expected value of this game?

$0.3(\$15) + 0.7(\$-4) = \$1.70$

7. There is a $\frac{2}{7}$ chance you win $5 for game. There is a $\frac{1}{7}$ chance that you win $10. The only other possibility is that you lose $6. Find the expected value.

$\frac{2}{7}(5) + \frac{1}{7}(10) + \frac{4}{7}(-6) = \$-0.57$

8. A certain site of an aerospace engineering company wants to submit a bid to remodel their site. The research and planning needed to simply make the bid costs $8,000. If the bid is accepted by corporate headquarters, the company will be able to remodel their site and can expect to then make $34,000 profit. If the bid only has a 15% chance of being accepted, would you advise the company to spend the money to make the bid? Explain.

$.15(34000-8000)+.85(-8000)$

$.15(26000)+.85(-8000) = \$-2900$ no!

9. You pay $5 to roll a 6-sided standard die. If it turns up as a 5, you win $10. Otherwise, you lose.

What is the expected value for you?

$EV = \frac{1}{6}(5)+\frac{5}{6}(-5) = \$-3.33$

What is the fair price of this game?

$-3.33+5 = \$1.67$

10. 5 thousand raffle tickets are sold for $5 each. There is one grand prize of $2000, and 3 consolation prizes of $100. If Ms. Norris buys one ticket, what is the expected value?

$EV = \frac{1}{5000}(1995)+\frac{3}{5000}(95)+\frac{4996}{5000}(-5)$

$-\$4.54$

What is the fair price of this game?

$FP = -4.54+5$

$\$0.46$

III. *For the following games, guess who you think has the advantage (you or the house) then find the expected value. If the game is unfair, find the fair price of the game.*

11. You pay $2 to play a game where you pick one card from a standard deck of 52 cards. If you draw a red card you win $1, if you draw a black jack you win $25, otherwise you lose.

$EV = \frac{26}{52}(-1)+\frac{2}{52}(23)+\frac{24}{52}(-2) = -.54$

$FP = -.54+2$

$\$1.46$

12. You must pay 50 cents to play a game where you roll 2 dice. If you roll doubles you win $2, otherwise you lose.

11 22 33 44 55 66

36 possibilities

$EV = \frac{6}{36}(1.50)+\frac{30}{36}(-.50) = -.17$

$FP = -.17+.50$

$\$0.33$

13. You go to the fair and play lots of games. One game features ducks sitting in a baby pool full of water. There is a design drawn on some of the ducks' bottoms. One duck has a star, which wins the player $4. Three ducks have a heart, which wins $2. Six ducks have a circle, which wins $0.50. There are 20 ducks in all; all the rest of the ducks have plain bottoms. What is the price that should be charged to make this a fair game?

$EV = \frac{1}{20}(4)+\frac{3}{20}(2)+\frac{6}{20}(.50)+\frac{10}{20}(0) = \$.65$

FP is $\$.65$