

## Expected Value

(Section 13.4)

The objectives for this section include:

1. Describe how probability can be used to estimate reliability.
2. Understand the meaning of expected value.
3. Use expected value to solve applied problems to determine if they are fair.

1) Mathematically how is the independence of two events defined on p. 753?

As you are watching the video clip on random variables respond to the following:

2. What assumption did the engineers make that lead to the Challenger's explosion?
3. How should probability be used to estimate reliability of the O-rings?
4. What needs to be kept in mind when risk is involved?

The expected value tells how much, on the average over the long run, each play is worth to you. It takes into account the amount of money you pay to play.

**Expected Value** = (Probability of Event 1)(Value of Event 1) + (Probability of Event 2)(Value of Event 2) + ...

You need to include the cost of playing in the value of each event or the cost at the end

**1. Class Practice** – A coin game charges \$1 to play a round that involves flipping three coins. If you have two or three heads, you win \$3; otherwise you lose your dollar. Calculate the expected value for this game.

- a) List the set that includes two or three heads
- b) Calculate the expected value using the net values of each event
- c) Calculate the expected value using the gross value winnings minus the cost of playing.

**2. Class Practice** – Five hundred tickets are sold for a raffle that charges \$1/ticket.  
The prize is a new i-pod valued at \$400.

a) What is the expected value?

b) What is the organizers total expected profit?

**In a fair game, you break even over the long run so the expected value = 0.**

**3. Class Practice** – Calculate the price to play the coin game described in #1 so that it would make the game fair.

Complete **Quiz Yourself** **12** on p. 765

**4. Class Practice** – #9 from p. 766 A card is drawn from a standard 52-card deck. Calculate your expected value if a heart is drawn, you win \$10 otherwise you lose.

Is this a fair game? \_\_\_\_\_ If not what is a fair price to charge? \_\_\_\_\_

**Assignment for Monday 3/29**

Read pp. 761-766, Complete #1, 3, 5, 6, 11, 14, 15, 19, 31, 37 on pp. 766-768  
& Section 13.4 Handout

Test over Chapters 1, 2, 12, & 13 will be Wed. March 31 with a take-home part Due Wed. April 7<sup>th</sup>. To be prepared for this exam you should complete the Practice Test posted in Unit 3 of the course website for March 26<sup>th</sup> at [www.mnstate.edu/harms/102/spr10/102U3.htm](http://www.mnstate.edu/harms/102/spr10/102U3.htm)