

February 16, 2011
It is E370 Time!!!

□ Announcements

- ✓ The data set for sample exam C has been restored.
- ✓ There is NO pre-lab quiz due this week in lab.
- ✓ You may use ANY of the tool cards you wish on the lab exam.
- ✓ You may NOT use ANY calculator. You must use Excel for all calculations.
- ✓ There is a review session tonight from 7:00 to 9:00 PM in BH310.
- ✓ Peer tutors have a review session tonight from 8:00 to 9:00 in BH308.
- ✓ Answers to Warm Ups questions are automatically available after the Warm Ups close, accessed in the same way the Warm Ups are.
- ✓ Exam One scores are calculated this way:
(# correct -X- 3) + either 0 or 1.

A question to get you thinking: This table contains daily sales data for a particular fruit stand in Michigan.

Fruit	Price/lb	Mean	Variance
Peaches	\$1	20	25
Apples	\$0.50	50	16
Cherries	\$3	35	4
Cov of Peaches and Apples			-3
Cov of Apples and Cherries			2
Cov of Cherries and Peaches			5

Write the formula for the covariance term for

- *peaches and apples
- *apples and cherries
- *cherries and peaches

- ✓ Calculate the variance of fruit sales.

- What will we do today?
 - ✓ Practice calculating expected values of linear combinations.
 - ✓ Consider two well-known discrete distributions.
 - ✓ Discuss the characteristics of the distributions.
 - ✓ Practice recognizing binomial variables.
 - ✓ Practice defining binomial variables.
 - ✓ Look at calculating binomial probabilities.
 - ✓ Consider the shape of binomials and what affects it.
 - ✓ Look at expected values of Bernoullis and binomials.

- The Bernoulli Distribution
 - ✓ the simplest of all discrete distributions
 - ✧ A single experiment **MUST** result in one of two mutually exclusive and collectively exhaustive outcomes
 - ✧ Outcomes are usually called "Success" and "Failure"
 - ✧ $P(\text{success}) = \pi$
 - ✧ $P(\text{failure}) = (1-\pi)$
 - ✓ Must define "success" and know π

- The Binomial
 - ✓ composed of several identical, independent Bernoulli trials.

- What is the difference?

- What other information would you need to determine if the scenario represents a true Binomial?
- ✓ Four necessary characteristics are:
- ✧ the outcome of EACH TRIAL must be one of two mutually exclusive and collectively exhaustive outcomes;
 - ✧ the random variable X is the result of counting the number of successes in a fixed number of trials, and is, thus, discrete;
 - ✧ $P(\text{success})$ remains constant over all trials;
 - ✧ each trial is independent of the other(s).

- Do these scenarios meet the binomial distribution criteria? Why or why not?

1. Ten bolts were selected randomly from a production line and the diameter of each was measured.

2. Past study shows that 13 of the 19 adult residents of Shepherd's Pass, Utah, favor gun control. You wish to talk to a sample of 5 from this population and are curious about how likely it is that all five of them will not favor gun control.

3. About 30% of wells drilled in areas deemed favorable strike oil. A company has found 5 sites with favorable conditions, that are widely separated geographically, and decides to drill at each site.

- Necessary Information for the Binomial
- ✓ Success must be defined.
 - ✓ Number of trials must be determined.
 - ✓ The probability of success must be known or estimated.
 - ✓ Sample space must be defined.

- For each, define success and write down n , π , and the sample space.
- A. About 3% of pet owners will give Valentine's Day gifts to their pets. Randomly select 15 pet owners.
- B. Typically, 10% of couples get engaged on Valentine's Day. Survey 35 randomly selected engaged couples.
- C. In the United States, 64% of men do not make plans in advance for a romantic Valentine's Day with their sweethearts. Randomly poll 200 men.
- About 30% of wells drilled in areas deemed favorable strike oil. A company has found 5 sites with favorable conditions, that are widely separated geographically, and decides to drill at each site.
- If you had no access to technology, how would you complete this table?

X	P(X)
0	
1	
2	
3	
4	
5	

- Let's use this formula!

$$P(x) = \frac{n!}{x!(n-x)!} \pi^x (1-\pi)^{n-x}$$

- Let's do something else!

=BINOMDIST(x,n,π,0)

X	Command	P(X)
0	=BINOMDIST(0,5,0.3,0)	0.1681
1	=BINOMDIST(1,5,0.3,0)	0.3601
2	=BINOMDIST(2,5,0.3,0)	0.3087
3	=BINOMDIST(3,5,0.3,0)	0.1323
4	=BINOMDIST(4,5,0.3,0)	0.0284
5	=BINOMDIST(5,5,0.3,0)	0.0024

Number of Oil Strikes Out of Five

