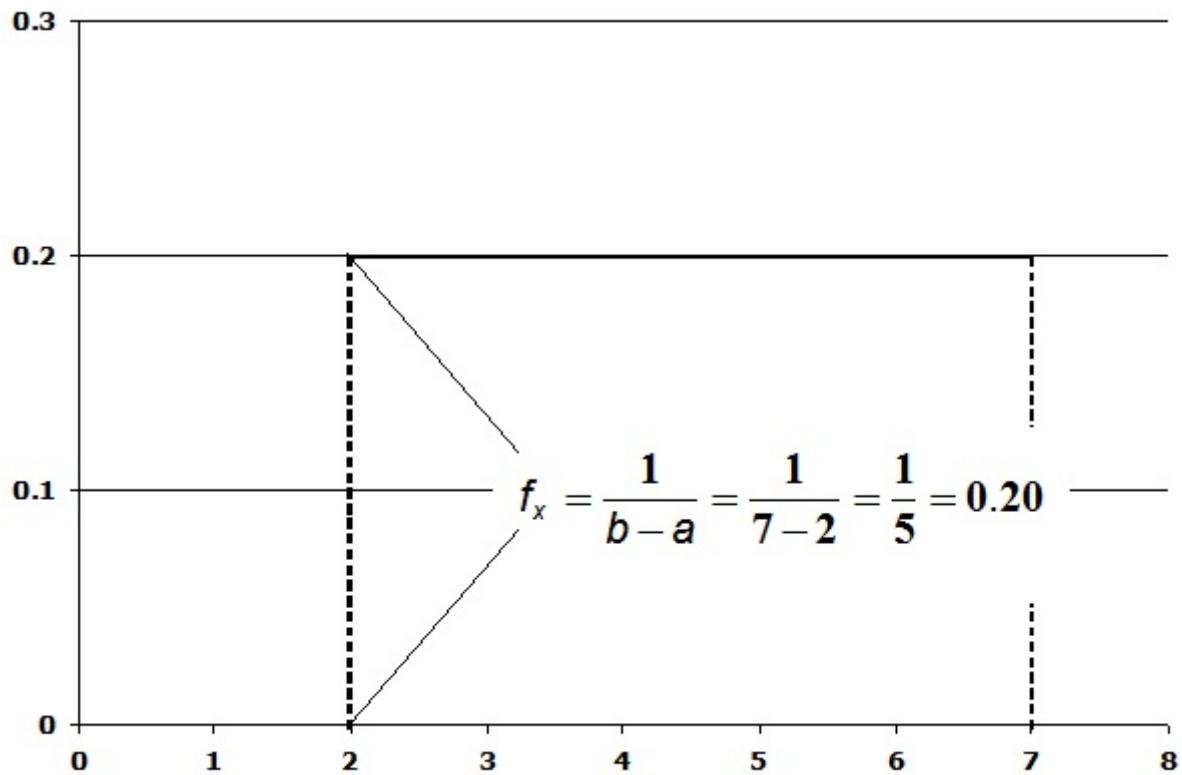


February 23, 2011
It is E370 Time!!!

□ Announcements

✓ In reading 12.4 for today, the following picture is presented. The values inside the box are not legible so they are presented here:

$$f_x = \frac{1}{b-a} = \frac{1}{7-2} = \frac{1}{5} = 0.20$$



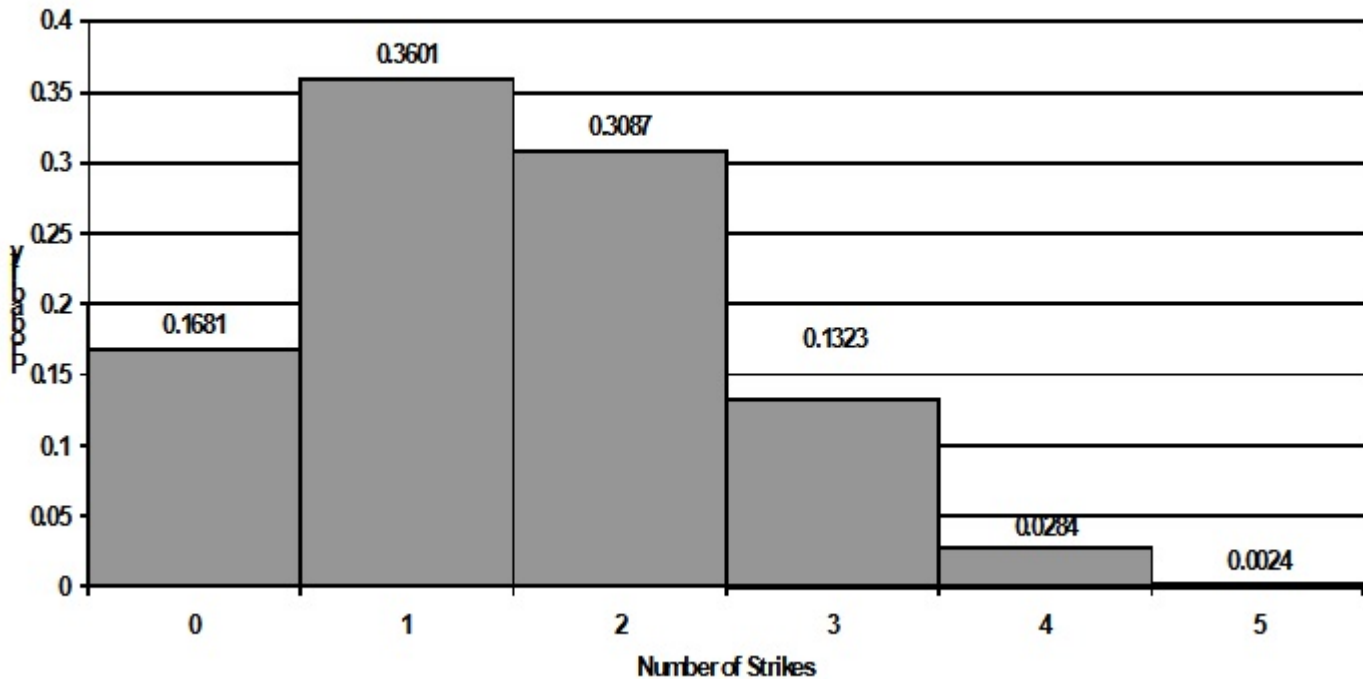
A question to get you thinking: Calculate the expected value and variance of the following distributions:

Bernoulli		Binomial	
X	P(X)	X	P(X)
0	0.70	0	0.1681
1	0.30	1	0.3601
		2	0.3087
		3	0.1323
		4	0.0284
		5	0.0024

- What will we do today?
 - ✓ Practice calculating expected values and variances.
 - ✓ Review the BINOMDIST command.
 - ✓ Practice the BINOMDIST command.
 - ✓ Consider the parameters of the binomial.
 - ✓ Develop rules for determining the shape of a binomial given certain circumstances.
 - ✓ Summarize the Bernoulli and the binomial.
 - ✓ Consider the difference between discrete and continuous random variables.
 - ✓ Talk about cases where we choose to ignore the discrete-ness of data.
 - ✓ Talk about the uniform distribution.
 - ✓ Practice calculating uniform probabilities.



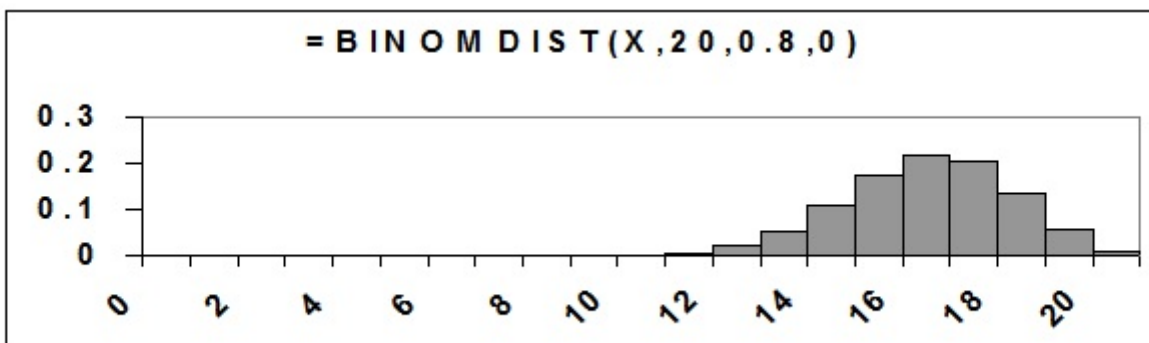
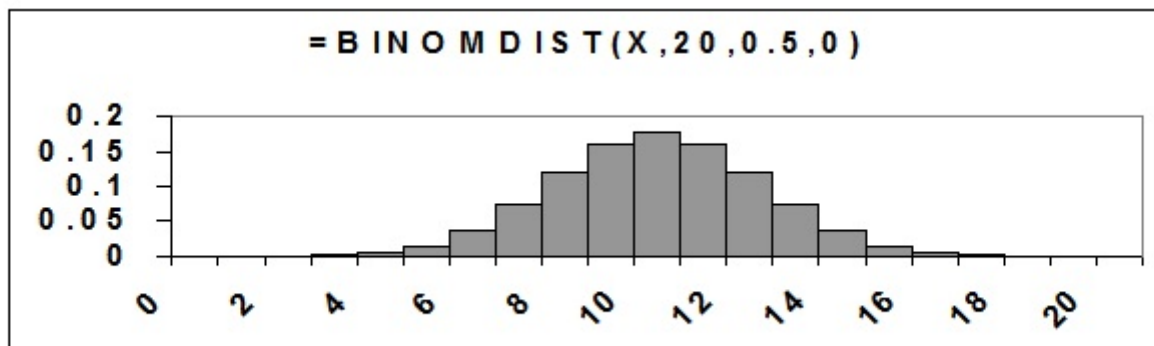
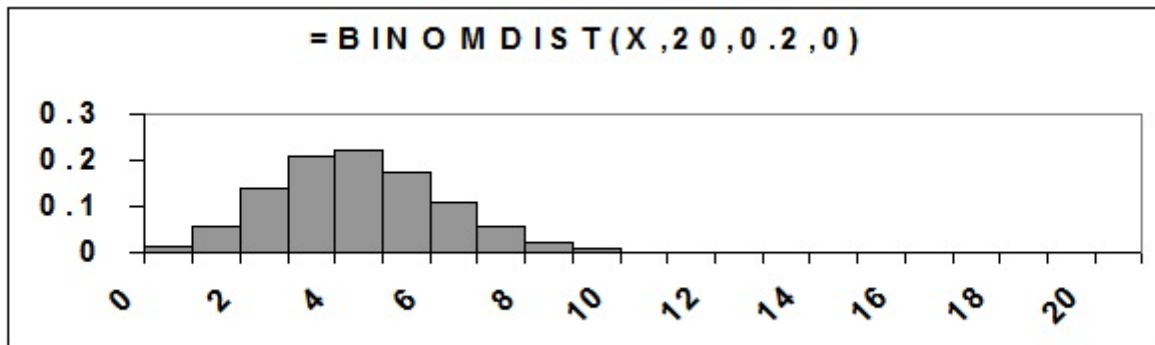
Number of Oil Strikes Out of Five



- =BINOMDIST(X, n, π, 0/1)
- Practice: In your teams, write the commands which will give you the following probabilities.
- The company must have at least 2 strikes to cover its costs. What is the probability that the company will cover its costs?
- What is the probability that the company will NOT cover its costs?
- What is the probability that more than two but no more than four wells come in?

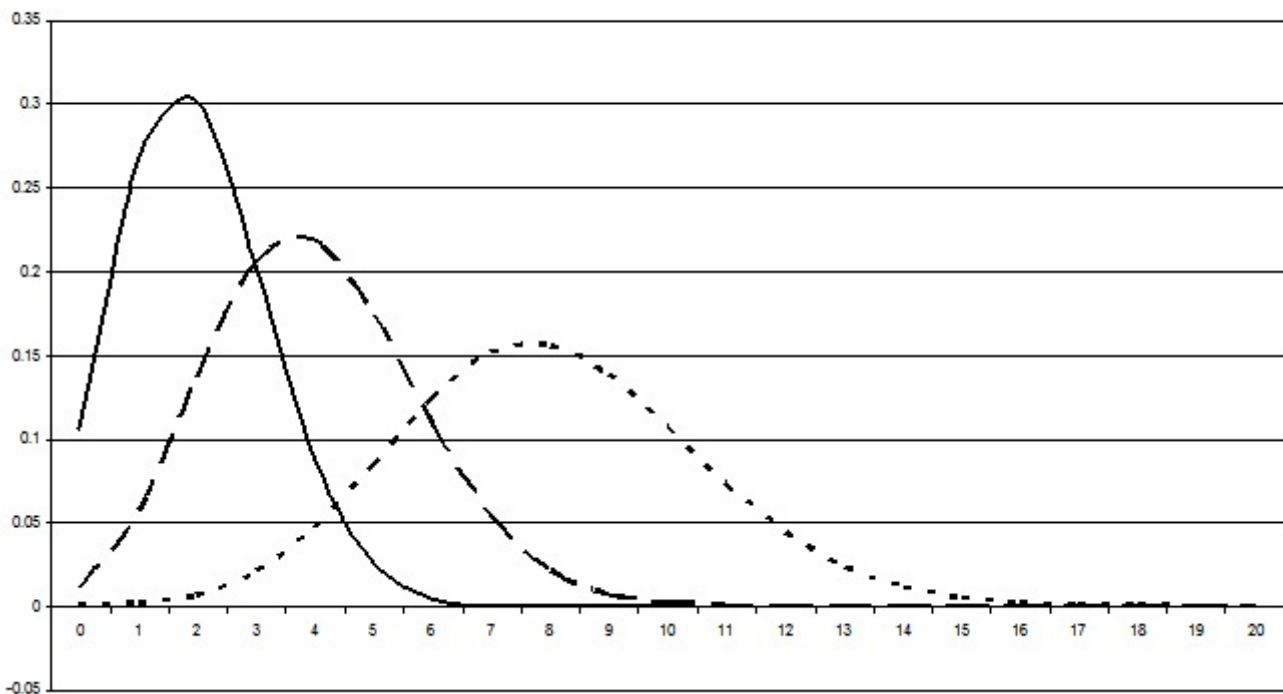
□ How does varying the value of π change the look of the binomial?

- ✓ $\pi < 0.5$, binomial is right skewed
- ✓ $\pi > 0.5$, binomial is left skewed
- ✓ $\pi \approx 0.5$, binomial is symmetric



- How about changing the value of n ?
 - ✓ When n is small, the binomial is determined by π .
 - ✓ However, as n becomes large, the binomial becomes more and more symmetric, regardless of π .

- When is n large?
 - ✓ That depends on π . . .

Binomdist with constant π , increasing n 

- For each value of π , state the shape of the resulting binomial:
 - ✓ $\pi = 0.1$
 - ✓ $\pi = 0.49$
 - ✓ $\pi = 0.97$

- For each value of π , state the value of n at which it would be appropriate to consider the distribution symmetric.
 - ✓ $\pi = 0.1$

 - ✓ $\pi = 0.49$

 - ✓ $\pi = 0.97$

- Final thoughts on the Bernoulli
 - ✓ a one-parameter distribution

 - ✓ π completely defines any Bernoulli

 - ✓ $E(X) = \pi \quad V(X) = \pi(1 - \pi)$

- and the binomial?
 - ✓ the binomial is the sum of n Bernoullis

 - ✓ it is defined completely by n and π

 - ✓ $E(x) = n\pi \quad V(X) = n\pi(1 - \pi)$

- What is the difference between discrete and continuous random variables that affects us the most?
- Why might we want to treat discrete variables as if they were continuous?
- The simplest continuous distribution:
The Uniform
- Characteristics of the Uniform
 - ✓ pdf is a horizontal line.
 - ✓ The height of the line is calculated by

$$\frac{1}{b-a}$$

where a and b are the endpoints of the interval over which the variable is defined.

- ✓ Probabilities are calculated as areas of rectangles.
- ✓ $E(X) = \frac{a+b}{2}$ ✓ $V(X) = \frac{(b-a)^2}{12}$

- Suppose that an airline quotes a flight time of 130 minutes between two cities. Furthermore, suppose that historical flight records indicate that the actual flight time between the two cities, X , is uniformly distributed between 120 minutes and 140 minutes.
- ✓ What is the pdf?
 - ✓ What is the probability that a flight time is at least 137 minutes?
 - ✓ What is the probability that a flight time is between 115.7 and 125.5 minutes?
 - ✓ Calculate the mean flight time and the standard deviation of the flight time.

