

March 25, 2009  
It is E370 Time!!!

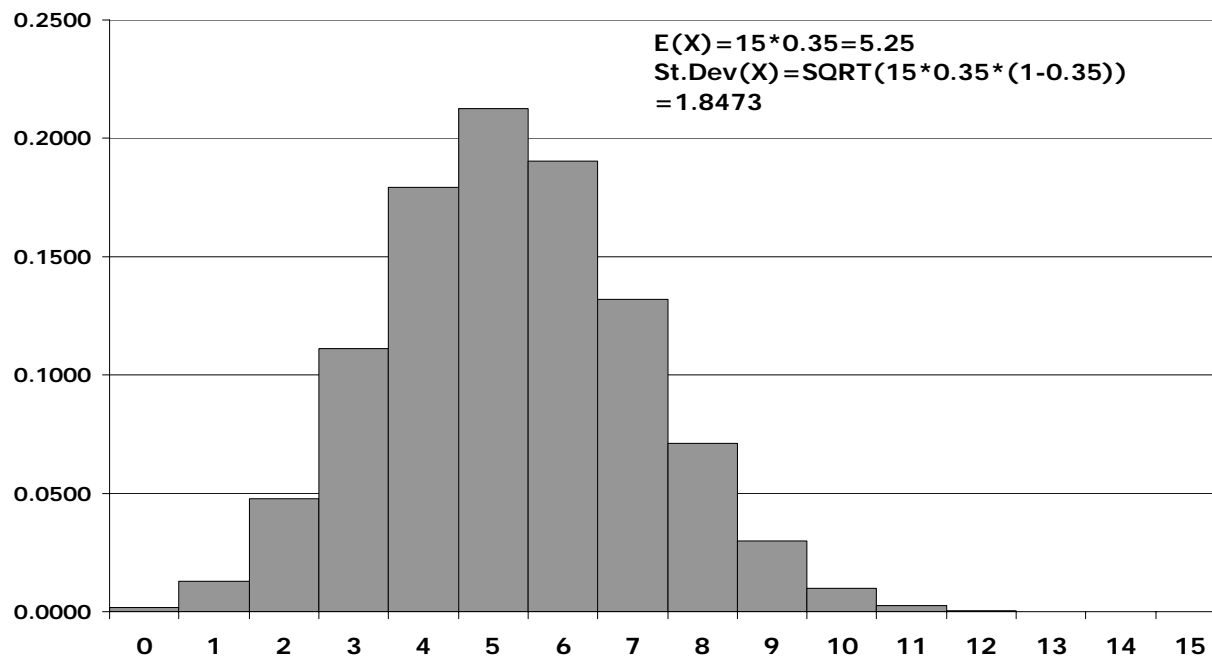
- Announcements
- Today's Goals: You should be able to
  - ✓ transform Binomial parameters into Normal parameters.
  - ✓ correctly use a continuity correction factor.
  - ✓ estimate Binomial probabilities with the Normal.
  - ✓ define the Student's t distribution.
  - ✓ compare and contrast the Student's t to the Standard Normal.
  - ✓ appropriately select when to use the Student's t distribution.
- Next Time~~Brave New Worlds!
- Announcements
  - ✓ Pre-Lab Quiz 7 Clarification: Question 4 on the Pre-lab Quiz on page 80 in the Lab Manual requires additional information. To answer the question about the level of weekly income which can be counted on 90% of the time, assume the distribution is Normal.
  - ✓ There are 3 course workbook corrections on Class Announcements.
  - ✓ Grade Freeze will take effect Friday at 8:00 AM.
- The Binomial/Normal Link
  - ✓ What happens to the shape of the binomial distribution when  $\pi$  is held constant but  $n$  increases?
  - ✓ What are the formulas for the mean and standard deviation of a binomial distribution?
  - ✓ What is the difference between a Normal distribution and a Binomial distribution?
  - ✓ Why must we use a "continuity correction factor" when we estimate a probability of a discrete random variable using a continuous distribution?

□ Suppose that  $X$  has a binomial distribution with  $n = 15$  and  $\pi = 0.35$ .

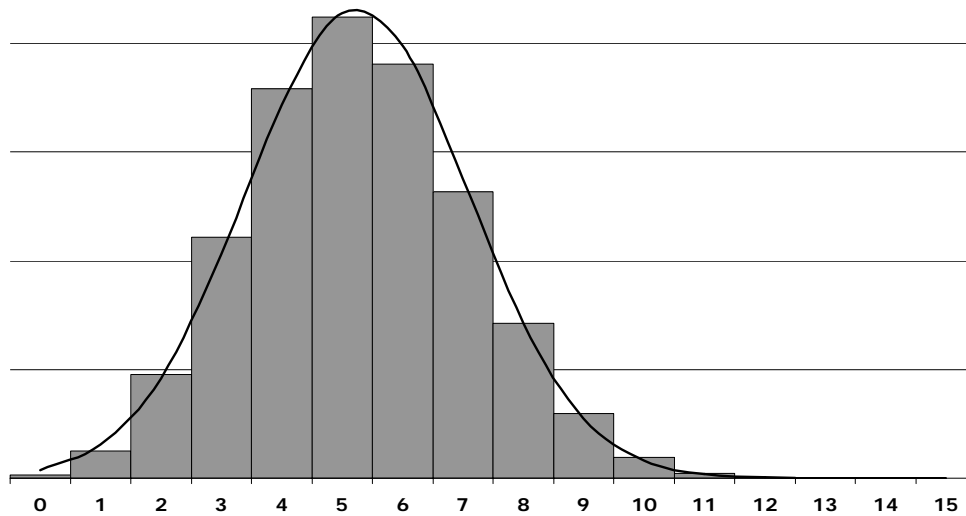
✓ Sketch a picture using this information:

0	0.0016
1	0.0126
2	0.0476
3	0.1110
4	0.1792
5	0.2123
6	0.1906
7	0.1319
8	0.0710
9	0.0298
10	0.0096
11	0.0024
12	0.0004
13	0.0001
14	0.0000
15	0.0000

**Binomial  $n=15$ ,  $\pi=0.35$**



- Test to see if the use of the normal approximation is OK.  
 ✓ If OK, add the normal distribution to your graph, then use the normal approximation with continuity corrections on the following.



- ✓ Write down the Excel command.

- ◇  $P(x = 5)$
- ◇  $P(x \leq 6)$
- ◇  $P(x < 4)$
- ◇  $P(x \geq 6)$
- ◇  $P(x > 6)$

$P(x=5)$	<code>=NORMDIST(5.5,5.25,1.85,1)- NORMDIST(4.5,5.25,1.85,1)</code>	0.2112
$P(x \leq 6)$	<code>=NORMDIST(6.5,5.25,1.85,1)</code>	0.7504
$P(x < 4)$	<code>=NORMDIST(3.5,5.25,1.85,1)</code>	0.1721
$P(x \geq 6)$	<code>=1- NORMDIST(5.5,5.25,1.85,1)</code>	0.4463
$P(x > 6)$	<code>=1- NORMDIST(6.5,5.25,1.85,1)</code>	0.2496

- When we don't have enough information to use the Normal, what can we do?
- Compare and contrast the  $t$  and the  $Z$

Student's $t$	Standard Normal $Z$

□ Excel and the Student's  $t$

✓ =TDIST(ABS( $t$ ), df, 1 or 2)

✓ =TINV( $\pi$ , df)

