STA 291 Spring 2009

LECTURE 14 TUESDAY, 24 MARCH

Le Menn

- 8 Continuous Probability Distributions
 8.2 Normal Distribution
- Next online homework is due **Saturday**
- Suggested Reading
 - Study Tools Chapter 8.2 (Normal Distribution)
 - OR: Section 8.2 in the textbook
- Suggested problems from the textbook:
 8.16, 8.18, 8.22, 8.26, 8.30, 8.36, 8.44, 8.56, 8.70

Calculation of Normal Probabilities

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Table 3:

Gives amount of probability $\leq z$, the *standard normal* random variable.

Example exercises: p. 274, #8.17, 24, and 27.

So what about the "probability to the left of $\mu + z\sigma$ " stuff from last time?

Normal Distribution Table

- Table 3 shows, for different values of *z*, the probability to the left of $\mu + z\sigma$ (the cumulative probability)
- Probability that a normal random variable takes any value up to *z* standard deviations above the mean
- For z = 1.43, the tabulated value is .9236

----- ((4))

• That is, the probability **less than or equal to** μ + **1.43** σ for a normal distribution equals .9236

Why the table with Standard Normal Probabilities is all we Need

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- When values from an arbitrary normal distribution are converted to *z*-scores, then they have a standard normal distribution
- The conversion is done by subtracting the mean μ , and then dividing by the standard deviation σ :

$$z = \frac{x - \mu}{\sigma}$$

• Example exercises: p. 274, #8.38, 45

z-scores: properties and uses

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• The *z*-score for a value *x* of a random variable is the number of standard deviations that x is above μ

• If *x* is below μ , then the *z*-score is negative

• The *z*-score is used to compare values from different (normal) distributions

z-scores: properties and uses

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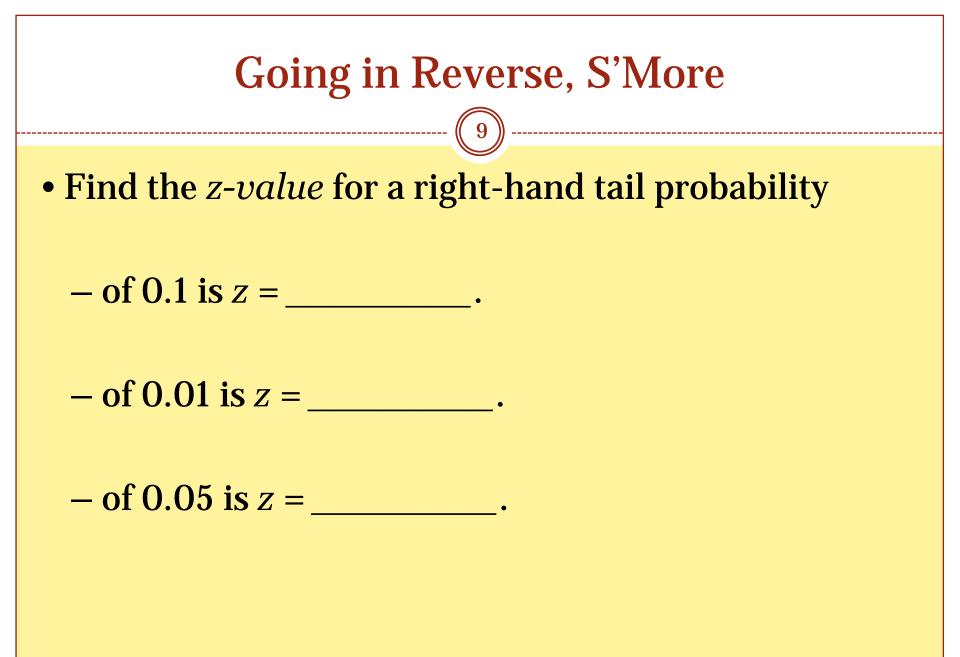
- The *z*-score is used to compare values from different normal distributions
- SAT: $\mu = 500$, $\sigma = 100$
- ACT: $\mu = 18$, $\sigma = 6$
- Which is better, 650 in the SAT or 25 in the ACT?

$$z_{\text{SAT}} = \frac{650 - 500}{100} = 1.5 \qquad z_{\text{ACT}} = \frac{25 - 18}{6} = 1.17$$

Backwards *z* **Calculations**

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- We can also use the table to find *z-values* for given probabilities
- Find the *z-value* corresponding to a right-hand tail probability of 0.025
- This corresponds to a probability of 0.975 to the left of *z* standard deviations above the mean
- Table: *z* = 1.96



Attendance Question #14

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Write your name and section number on your index card.

Today's question: