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**Activity #10: Normal Random Variables**

**Statistics**

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1. Suppose healthy human body temperatures are normally distributed with mean  $98.20^{\circ}$  F and standard deviation  $0.62^{\circ}$  F.
  - (a) A hospital uses  $100.6^{\circ}$  F as the lowest temperature considered to be a fever. What percentage of healthy people would be considered to have a fever by this definition? Does this percentage suggest that this cutoff is appropriate?
  
  
  
  
  
  
  
  
  
  
  - (b) Suppose the doctors at this hospital wish to revise their definition of “fever” to have a 5% false positive rate; that is, to choose a new cutoff temperature such that 5% of healthy peoples’ temperatures exceed it. What should the cutoff be?
  
  
  
  
  
  
  
  
  
  
2. From 1964 to 1998, US quarters were manufactured so that their weights were normally distributed with mean 5.67 g and standard deviation 0.06 g. Some vending machines allow the operator to adjust the weights of the coins which are accepted; if a large number of slugs are found in the machine, the acceptable weight threshold can be narrowed so that more slugs (and more real quarters) are rejected.
  - (a) Suppose the machine is set to accept coins weighing between 5.64 g and 5.70 g. What percentage of real quarters are rejected? Is this too high?
  
  
  
  
  
  
  
  
  
  
  - (b) Suppose we wish to set the machine so that all real quarters are accepted except those in the top 2.5% and the bottom 2.5% by weight. What should the cutoff weights be?

3. Scores on the 2014 SAT were normally distributed with mean 1511 and standard deviation 312; scores on the 2014 ACT were normally distributed with mean 21.1 and standard deviation 5.1. Assume that the two tests use different scales to measure the same aptitude.

If someone got a 2100 on the SAT in 2014, find their equivalent ACT score.

4. Standing eye heights of women are normally distributed with mean 1516 mm and standard deviation 63 mm.

(a) A door peephole is placed at a height that is uncomfortable for women with standing eye heights greater than 1605 mm. What percentage of women will find that height uncomfortable?

(b) An architect wants to design a door with a peephole which is comfortable for the highest 99% of standing eye heights of women. What standing eye height separates the top 99% of women from the bottom 1%?