Z-Score Practice Worksheet Name ______________________________

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1. A normal distribution of scores has a standard deviation of 10. Find the z-scores corresponding to each of the following values:

$$\frac{\text{Value} - \text{mean}}{\text{S.D}}$$

   a) A score that is 20 points above the mean.

   $z = +2$ $\frac{+20}{10}$

   b) A score that is 10 points below the mean.

   $z = -1$ $\frac{-10}{10}$

   c) A score that is 15 points above the mean

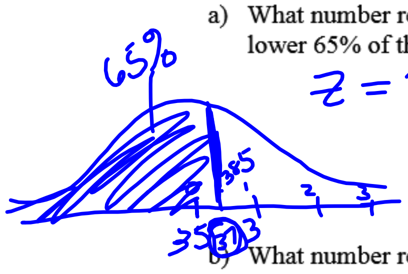
   $z = 1.5$ $\frac{15}{10}$

   d) A score that is 30 points below the mean.

   $z = -3$ $\frac{-30}{10}$

2. The Welcher Adult Intelligence Test Scale is composed of a number of subtests. On one subtest, the raw scores have a mean of 35 and a standard deviation of 6. Assuming these raw scores form a normal distribution:

   a) What number represents the 65th percentile (what number separates the lower 65% of the distribution)?



$z = \text{invnorm}(.65) = .385 = \frac{\text{Value} - \text{Mean}}{\text{SD}}$

$\frac{.385}{1} = \frac{x - 35}{6}$

$2.312 = x - 35$

$37.3 = x$

   b) What number represents the 90th percentile?

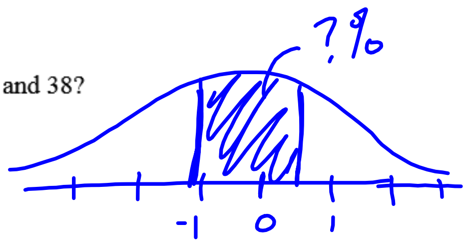
$z = \text{invnorm}(.90) = \frac{\text{Value} - \text{Mean}}{\text{Std Dev.}}$

$\frac{1.28}{1} = \frac{x-35}{6}$

$7.68 = x - 35$

$42.7 = x$

   c) What is the probability of getting a raw score between 28 and 38?

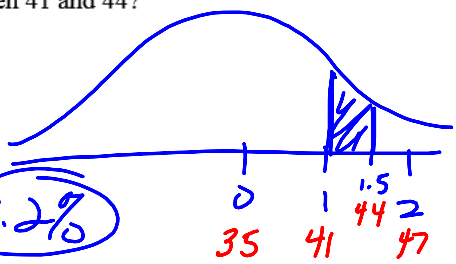


$z = \frac{28-35}{6} = \frac{-7}{6} = -1.167$

$z = \frac{38-35}{6} = \frac{3}{6} = .5$

$\text{normalcdf}(-1.167, .5) = 57\%$

   d) What is the probability of getting a raw score between 41 and 44?



$z = \frac{41-35}{6} = \frac{6}{6} = 1$

$z = \frac{44-35}{6} = \frac{9}{6} = 1.5$

$\text{normalcdf}(1, 1.5) = 9.2\%$

3. Scores on the SAT form a normal distribution with $\mu = 500$ (mean) and $\sigma = 100$ (SD).

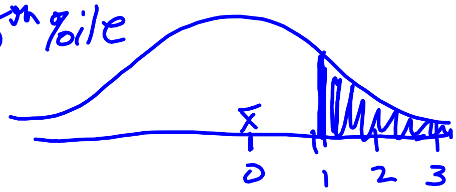
   a) What is the minimum score (value) necessary to be in the top 15% of the SAT distribution?

$z = \text{invnorm}(.85) = \dfrac{\text{Value} - \text{mean}}{\text{SD}}$ 85th %ile

$1.036 = \dfrac{x - 500}{100}$

$103.6 = x - 500$

$604 = x$

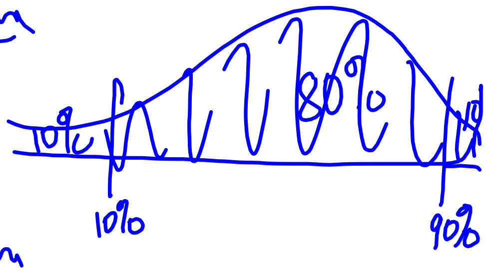


   b) Find the range of values that defines the middle 80% of the distribution of SAT scores ~~(372 and 628)~~.

$z = \text{invnorm}(.10) = \dfrac{\text{Value} - \text{Mean}}{\text{SD}}$

$-1.28 = \dfrac{x - 500}{100}$

$x = 372$



$z = \text{invnorm}(.90) = \dfrac{\text{Value} - \text{Mean}}{\text{SD}}$

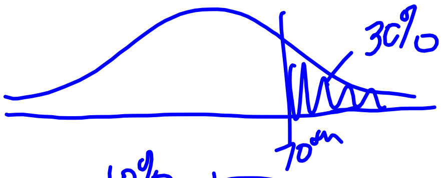
$1.28 = \dfrac{x - 500}{100}$

$x = 628$

$\boxed{372 \text{ to } 628}$

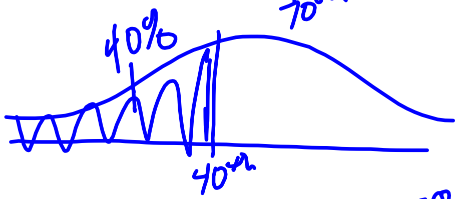
4. For a normal distribution, find the z-score that separates the distribution as follows:
   a) Separate the highest 30% from the rest of the distribution.

      $z = \text{invnorm}(.70) = .524$



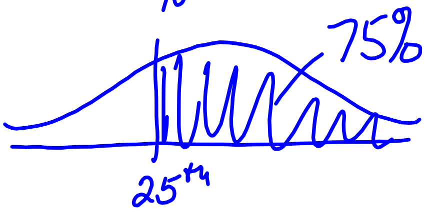
   b) Separate the lowest 40% from the rest of the distribution.

      $z = \text{invnorm}(.40) = -.253$



   c) Separate the highest 75% from the rest of the distribution.

      $z = \text{invnorm}(.25) = -.674$



%　　　　　　　$z=0$

5. For the numbers below, find the area between the mean and the z-score:
   a) z = 1.17

   normalcdf(0, 1.17) = .379 = 37.9%

   b) z = -1.37

   normalcdf(-1.37, 0) = .415 = 41.5%

HWK:

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