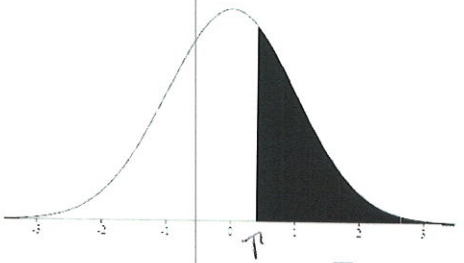
MAT 135, Discussion Questions 3.30

For each of the problems below, the percentage under the curve is indicated. Find the z or x cut-off values for the region given the mean and the specified standard deviation.

1. Why is it important to be able to determine if data is normally distributed?

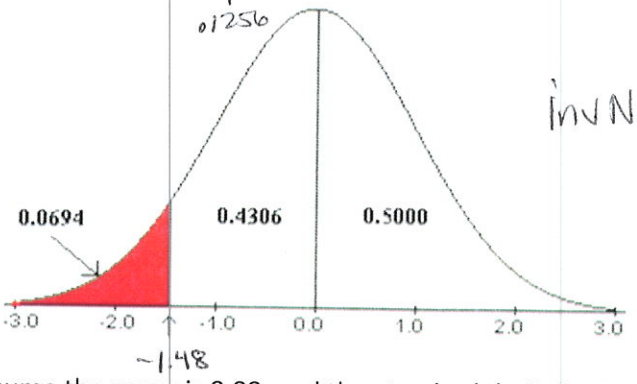
if it is not, calculations will be off
another distribution would do a better job

2. The area under the curve is 45%. With mean of 0 and the standard deviation is 1.



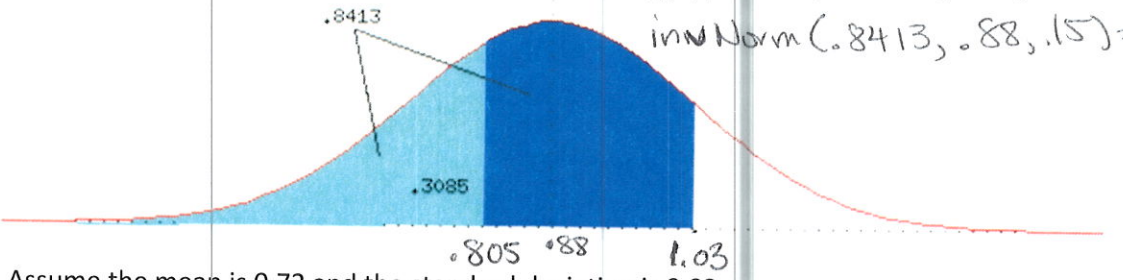
invNorm(.55) = .1256
must be prob. below!
↑ z-score comes out

3.



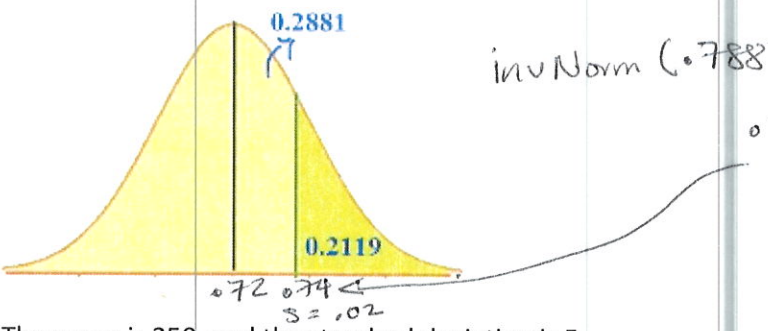
invNorm(.0694) = -1.48

4. Assume the mean is 0.88, and the standard deviation is 0.15.



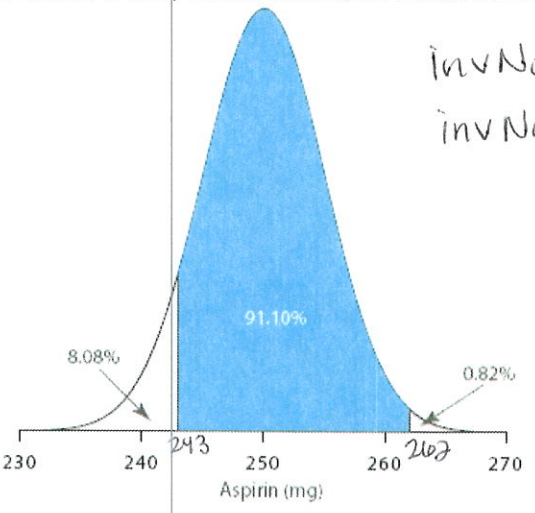
invNorm(.3085, .88, .15) = .80498
invNorm(.8413, .88, .15) = 1.02997

5. Assume the mean is 0.72 and the standard deviation is 0.02.



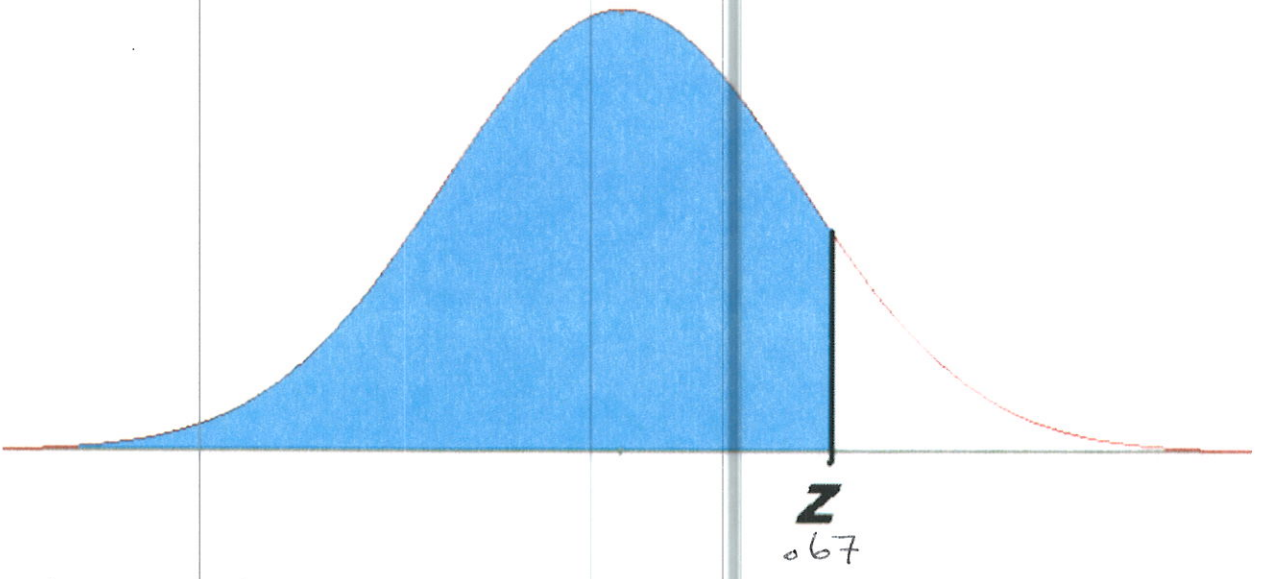
invNorm (.7881, .72, .02) =
.7359969

6. The mean is 250, and the standard deviation is 5.



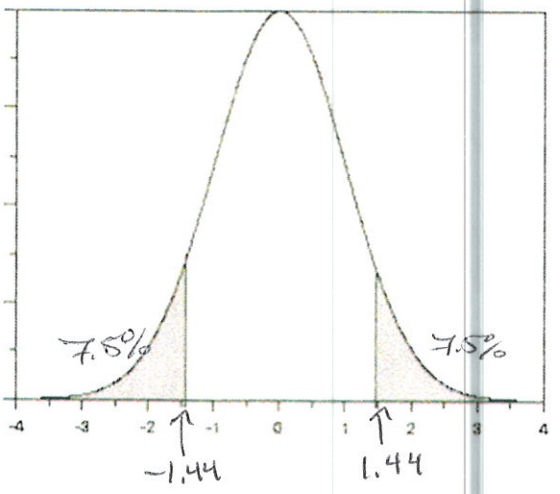
invNorm (.0808, 250, 5) = 243
invNorm (.9918, 250, 5) = 261.999

7. What is z if the shaded area is 75%?



invNorm (.75) = .6744897 = z

8. What is the z score (same but for the sign on both sides) if the probability of the shaded region is 15%?



invNorm(.075) =
−1.4395
≈1.44
Symmetric so
other value is +1.44

9. If a school wants to accept only the top 5% of SAT and ACT scorers, what are the cut-off values for the two tests? Recall that the SAT has a mean of 1498 and a standard deviation of 199 (total score), and the ACT has a mean of 21 and a standard deviation of 5.2. Draw a sketch of the normal distribution and label it appropriately.

invNorm(.95, 1498, 199) = 1825.3... 1825
invNorm(.95, 21, 5.2) = 29.55 ... 30

10. What conditions are necessary to approximate a binomial distribution with a normal distribution?

$np \geq 5$, $n(1-p) \geq 5$

11. When calculating the normal distribution data for the binomial distribution value for $x = 4$, why do we use bounds of 3.5 and 4.5 in the normal distribution?

in a continuous range of values, all the values between 3.5 & up to 4.5 round to x=4. and represents a step of size 1 where 4 is the midpoint

12. Approximate the binomial distribution for $n = 25, p = \frac{4}{7}, 5 \leq x \leq 7$ using the normal distribution. How close is the estimate?

true: binomialpdf(25, 4/7, 5) + binomialpdf(25, 4/7, 6) + binomialpdf(25, 4/7, 7) = .003045...

$\sigma = \sqrt{25 \cdot \frac{4}{7} \cdot \frac{3}{7}} = \sqrt{\frac{300}{49}}$

$\mu = 25 \cdot \frac{4}{7} = 14.285 = 7$

estimate: normalcdf(4.5, 7.5, 100/7, $\sqrt{\frac{300}{49}}$) = .0157

within ≈1%