251x0531 4/18/05 (Preliminary!!!!)

ECO251 QBA1
THIRD EXAM
Apr 25, 2005

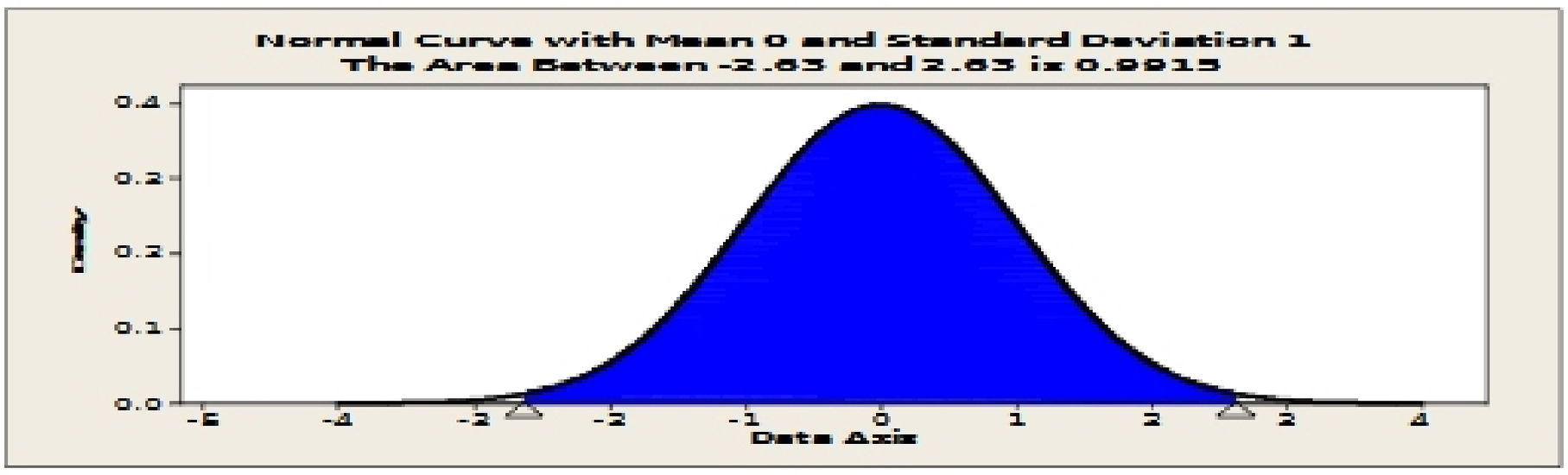
Name: _____
Student Number: _____
Class Time (Circle) 1pm 2pm

Part I: 16 points.

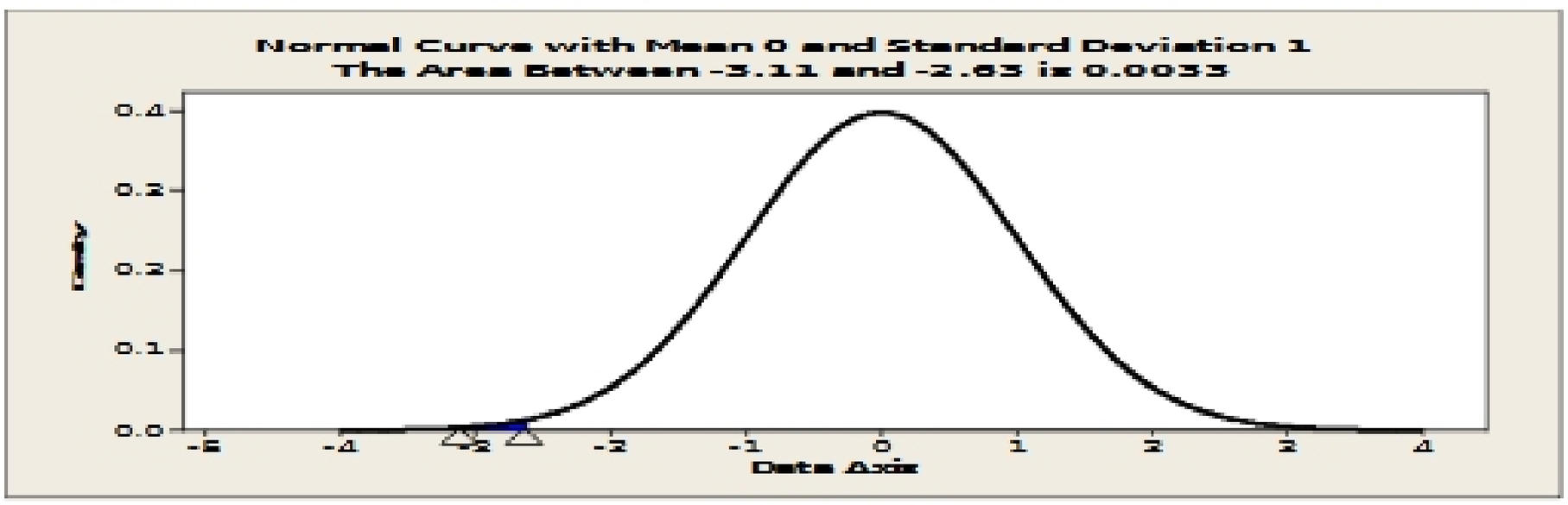
Z follows the standardized Normal distribution $(z \sim N(0,1))$.

Find the following. **Make diagrams! Add a vertical line at zero to these diagrams.**

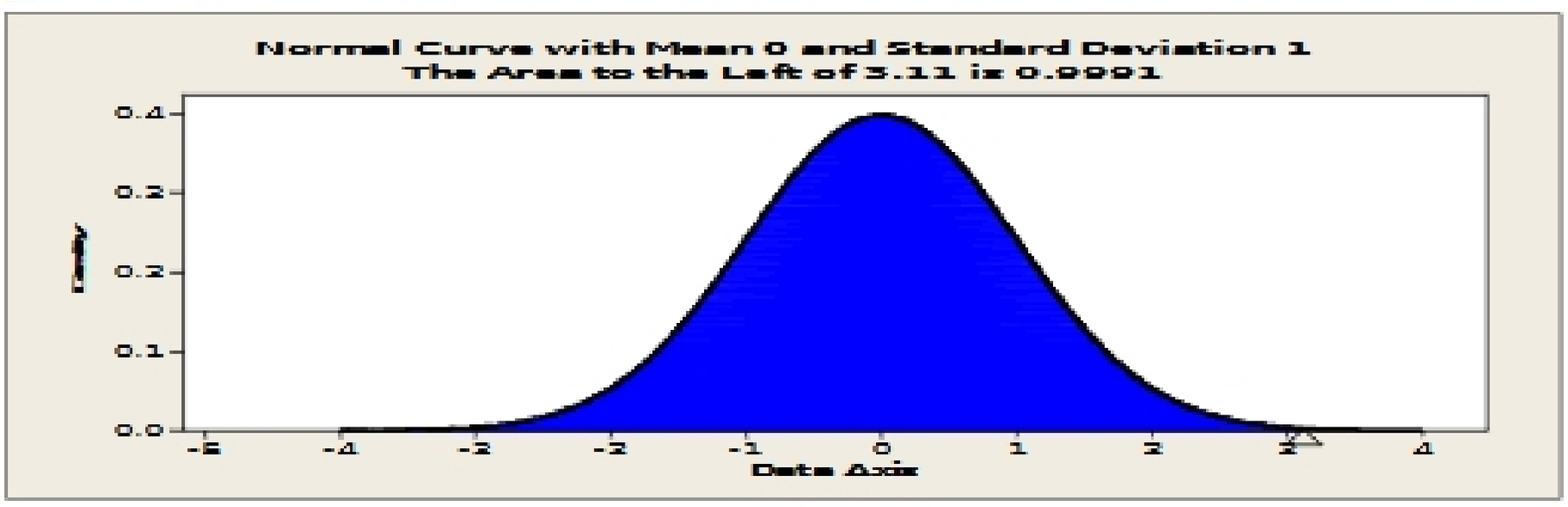
1. $P(-2.63 \le z \le 2.63) = P(-2.63 \le z \le 0) + P(0 \le z \le 2.63) = 2(.4957) = .9914$



2. $P(-3.11 \le z \le -2.63) = P(-3.11 \le z \le 0) - P(-2.63 \le z \le 0) = .4991 - .4957 = .0034$

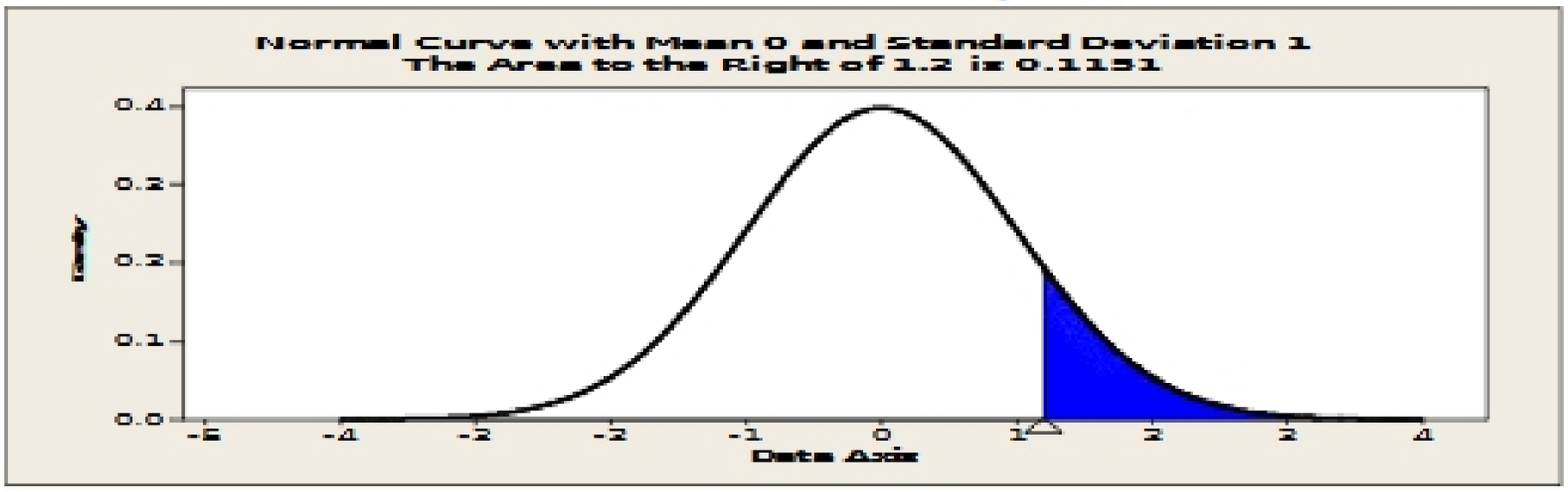


3. $F(3.11) = P(z \le 3.11) = P(z \le 0) + P(0 \le z \le 3.11) = .5 + .4991 = .9991$



4. $z_{.115}$ **Solution: Make a diagram.** $z_{.115}$ is defined as a point with 11.5% above it and thus 100% - 11.5% =88.5% below it, so it is the 88.5 percentile. *The diagram for* Z *will show an area with a probability of 88.5% below* $z_{.115}$ *. It is split by a vertical line at zero into two areas. The lower one has a*

probability of 50% and the upper one a probability of 88.5% - 50% =38.5%. The upper tail of the distribution above $z_{.115}$ *has a probability of 11.5%, so that the entire area above 0 adds to 50%.* From the diagram, we want <u>one</u> point $z_{.115}$ so that $P(z \le z_{.115}) = .8850$ or $P(0 \le z \le z_{.115}) = .3850$. The closest we can come is $P(0 \le z \le 1.20) = .3849$. We can say $z_{.115} \approx 1.20$.

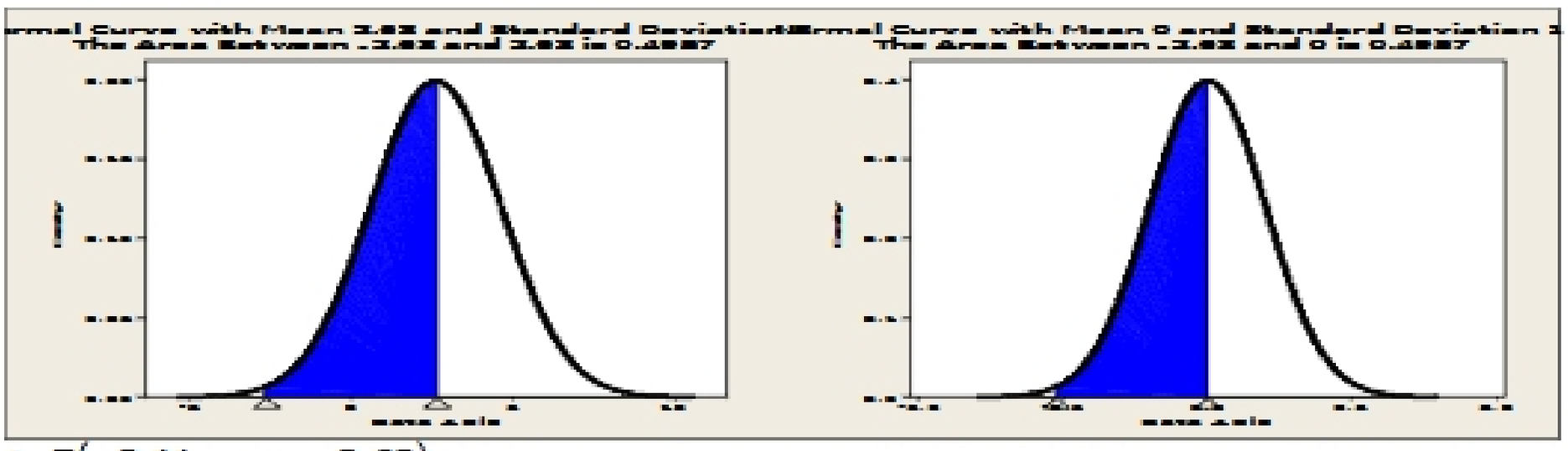


X follows the Normal distribution $(x \sim N(2.63, 2))$. **This means** $\mu = 2.63$ **and** $\sigma = 2.00$.
Find the following. **Make diagrams!**

Remember $z = \frac{x - \mu}{\sigma}$ **. As usual, people made diagrams of** X **with zero in the middle. Make up your mind! If you are diagramming** X **, put the mean in the middle; if you are diagramming** Z **put zero in the middle.**

5. $P(-2.63 \le x \le 2.63)$

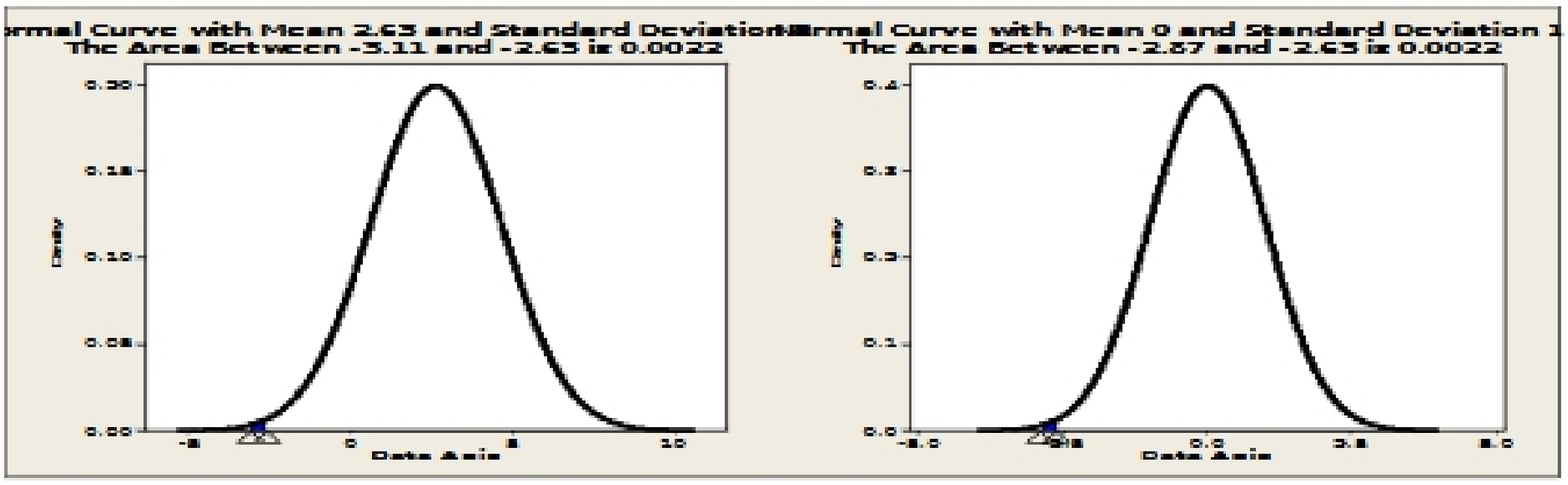
$$= P\left(\frac{-2.63 - 2.63}{2} \le z \le \frac{2.63 - 2.63}{2}\right) = P(-2.63 \le z \le 0) = .4957$$



6. $P(-3.11 \le x \le -2.63)$

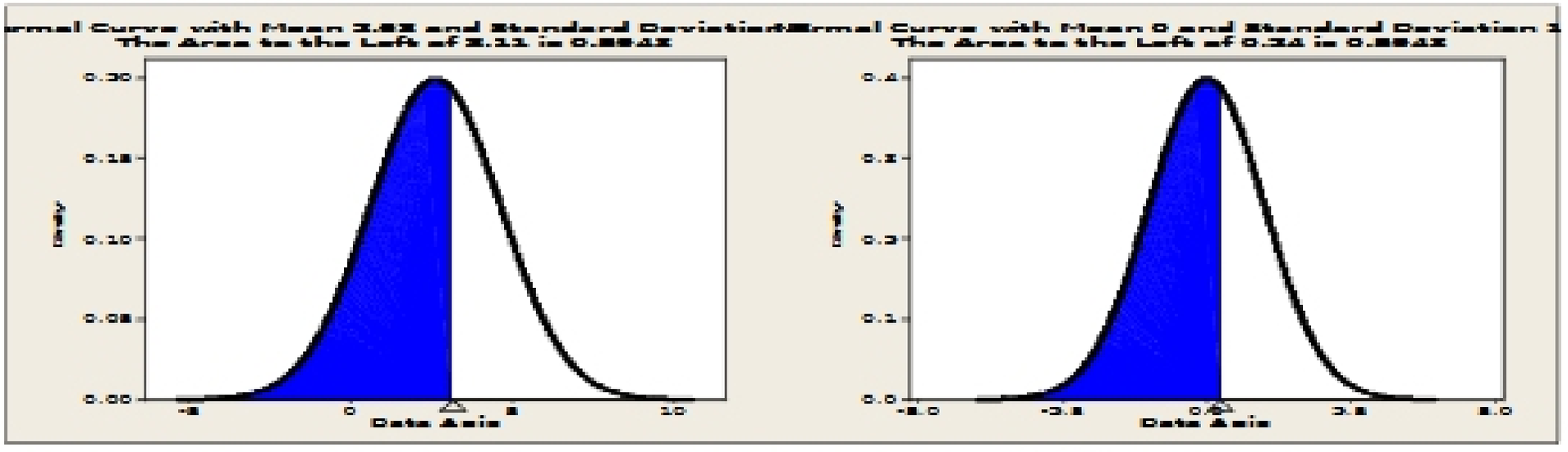
$$= P\left(\frac{-3.11 - 2.63}{2} \le z \le \frac{-2.63 - 2.63}{2}\right) = P(-2.87 \le z \le -2.63)$$

$$= P(-2.87 \le z \le 0) - P(-2.63 \le z \le 0) = .4979 - .4957 = .0022$$



7. $F(3.11) = P(x \le 3.11) = P\left(z \le \frac{3.11 - 2.63}{2}\right) = P(z \le 0.24) = P(z \le 0) + P(0 \le z \le 0.24)$

$= .5 + .0948 = .5948$



8. $x_{.115}$ In problem I4, we found $z_{.115} \approx 1.20$. The opposite of $z = \frac{x - \mu}{\sigma}$ is $x = \mu + z\sigma$, so

$x_{.115} \quad \mu + z_{.115}\sigma = 2.63 + 1.20(2) = 5.03$. **Check:**

$P(x \ge 5.03) = P\left(z \ge \frac{5.03 - 2.63}{2}\right) = P(z \ge 1.20)$

$= P(z \ge 0) - P(0 \le z \le 1.20) = .5 - .3849 = .1151$