Probability and Statistics – Mrs. Leahy Name: _____ Pd. _____

Worksheet 5.2: Normal Distributions – Finding Probabilities

Let x = red blood cell (RBC) count in millions per cubic millimeter of whole blood. For healthy females, x has an approximately normal distribution with a **mean $\mu = 4.8$** and a **standard deviation $\sigma = 0.30$.**

- **Convert x intervals to z intervals.**
- **Shade the indicated area on the standard normal curve.**
- **Find the indicated probabilities using the standard normal distribution table.**

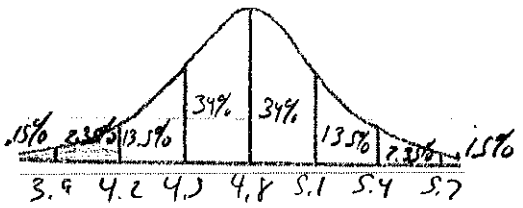
1) P(x < 4.2)

$\mu = 4.8$

$\sigma = .30$

$z = \frac{4.2 - 4.8}{.3}$

$z = -2$ ≈ 2.28% or 2.5%

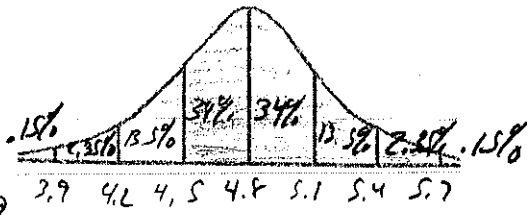


2) P(x > 4.5)

$z = \frac{4.5 - 4.8}{.3}$

$z = -1$ ≈ 1 − .1587 ≈ .8413 or 84%

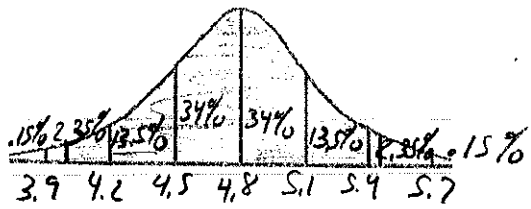
84.13%



3) 4.0 < x < 5.5

$z = \frac{4.0 - 4.8}{.3}$ $z = \frac{5.5 - 4.8}{.3}$

$z = -2.67$ ≈ .38% $z = 2.33$ ≈ 99.01% 99.01% − 0.38% ≈ 98.63%



4) If a female had an RBC count of 5.9 or higher, would that be considered unusually high? Explain using z values.

$z = \frac{5.9 - 4.8}{.3}$

$z = 3.67$

Yes it would be unusually high as a z-score of 3.67 is off the chart and well beyond a z-score of 3.49.

Assume that x has a normal distribution with the specified mean and standard deviation.

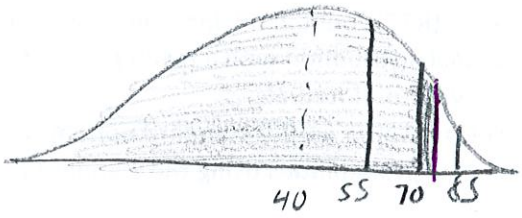
- **Convert x intervals to z intervals.**
- **Find the indicated probabilities using the standard normal distribution table.**

5. $P(x \leq 71); \mu = 40; \sigma = 15$

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

$$z = \frac{71 - 40}{15}$$

$$z = 2.07 \approx 98.08\%$$



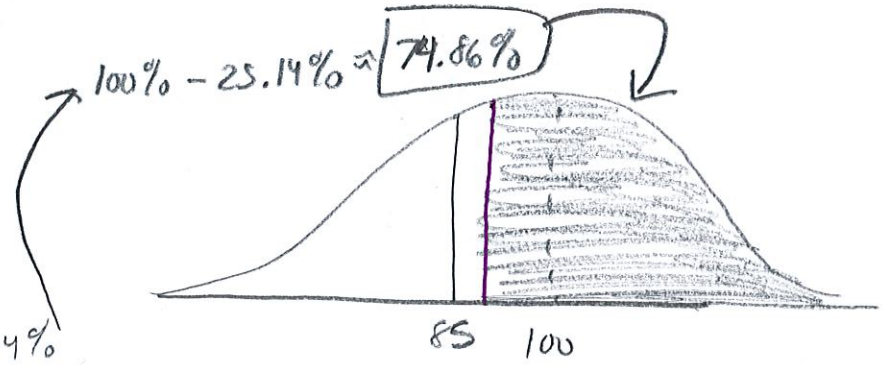
6. $P(x \geq 90); \mu = 100; \sigma = 15$

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

$$z = \frac{90 - 100}{15}$$

$$z = -0.67 \approx 25.14\%$$

$100\% - 25.14\% \approx 74.86\%$



7. $P(7 \leq x \leq 9); \mu = 5; \sigma = 1.2$

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

$$z = \frac{7 - 5}{1.2}$$

$$z = 1.67$$

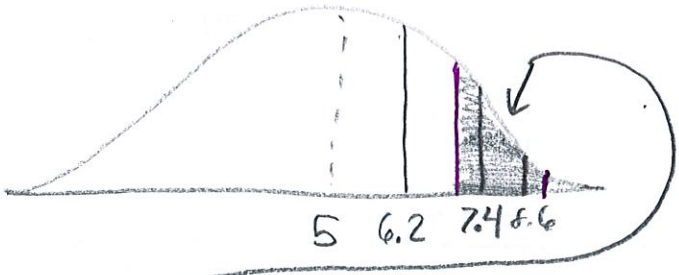
$$\approx 95.25\%$$

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

$$z = \frac{9 - 5}{1.2}$$

$$z = 3.33$$

$$\approx 99.96\%$$



$99.96\% - 95.25\%$

$\approx 4.71\%$

TABLE READING PRACTICE:

8. What is the probability that a z-score will be less than -3.5? 0%

What is the probability that a z-score will be more than-3.5? 100%