Worksheet: Applications of Normal Distributions

1) a) $\mu = 120$ $\sigma = 20$ b) $\mu = 15$ $\sigma = 2.5$ c) $\mu = 30$ $\sigma = 5$

2) a) $\mu = 27{,}989$ $\sigma = 3{,}250$

$$P(20{,}000 < x < 30{,}000) = P\left(\frac{20000-27989}{3250} < z < \frac{30000-27989}{3250}\right)$$

$$= P(-2.46 < z < 0.619) = 0.7251 \quad \boxed{72.5\%}$$

b) $$P(x < 20{,}000) = P\left(z < \frac{20000-27989}{3250}\right) = P(z < -2.46)$$

$$= .0069 \quad \boxed{0.7\%}$$

3) a) $\mu = 618{,}319$ $\sigma = 50{,}200$

$$P(x > 700{,}000) = P\left(z > \frac{700{,}000-618{,}319}{50{,}200}\right) =$$

$$P(z > 1.627) = .0518 \quad \boxed{5.2\%}$$

b) $$P(500{,}000 < x < 600{,}000) =$$

$$P\left(\frac{500{,}000-618{,}319}{50{,}200} < z < \frac{600{,}000-618{,}319}{50{,}200}\right) = P(-2.36 < z < -0.365)$$

$$= 0.3484 \quad \boxed{34.8\%}$$

4) a) $\mu = 1{,}019$ $\sigma = 90$

invnorm(.9) = 1.28

a) $$1.28 = \frac{x-1{,}019}{90}$$

$$\boxed{x = 1{,}134.2}$$

b) $$P(X > 1200) = P\left(z > \frac{1200-1{,}019}{90}\right)$$

$$= P(z > 2.01) = 0.022 \quad \boxed{2.2\%}$$

5) a) $\mu = 225 \quad \sigma = 10$

$P(200 < x < 220) = P\left(\frac{200-225}{10} < z < \frac{220-225}{10}\right)$

$= P(-2.5 < z < -0.5) = 0.3023$ **30.23%**

b) $P(x < 200) = P\left(z < \frac{200-225}{10}\right) = P(z < -2.5)$

$= 0.0062$ **0.62%**

6) a) $\mu = 56 \quad \sigma = 4$

$P(53 < x < 59) = P\left(\frac{53-56}{4} < z < \frac{59-56}{4}\right)$

$= P(-0.75 < z < 0.75) = 0.547$ **54.7%**

b) $P(58 < x < 63) = P\left(\frac{58-56}{4} < z < \frac{63-56}{4}\right) = P(0.5 < z < 1.75)$

$= 0.268$ **26.8%**

c) $P(50 < x < 55) = P\left(\frac{50-56}{4} < z < \frac{55-56}{4}\right) = P(-1.5 < z < -0.25)$

$= 0.334$ **33.4%**

7) $\mu = 45.8 \quad \mu = 3.6$

invnorm(.25) = -.6744

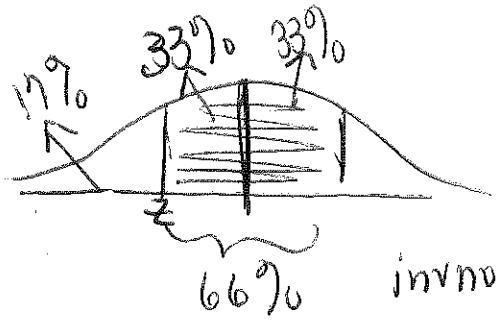
$z = -0.6744$

*Remember: Runners want low times!!

$-0.6744 = \frac{x - 45.8}{3.6}$

$x = 43.37$ min If 40 minutes is the qualifying time, a runner who completes the course in 43.37 min would not qualify.

8) $\mu = 6{,}492 \quad \sigma = 1{,}025$



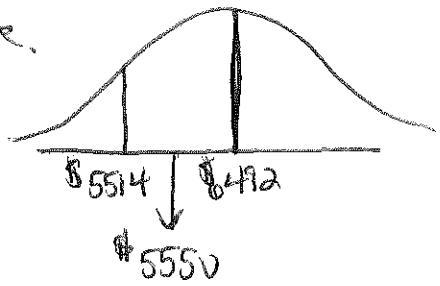
invnorm(.17) $= -.954$

$z = -0.954$

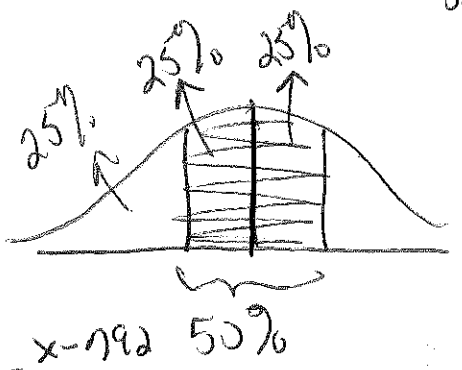
$-.954 = \frac{x - 6492}{1025}$

$x = \$5{,}514$

* Yes, a boat priced $5,550 would be sold in this store.



9) $\mu = 792 \quad \sigma = 103$



invnorm(.25) $= -.674$

$z = -0.674 \quad z = 0.674$

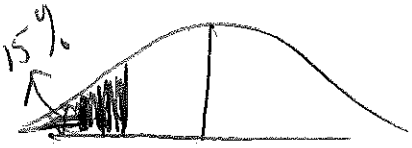
$-0.674 = \frac{x - 792}{103} \quad 0.674 = \frac{x - 792}{103}$

$x = 722.53$ low bound

$x = 861.47$ high bound

for middle 50%

10) $\mu = 5.9 \quad \sigma = 1.7$



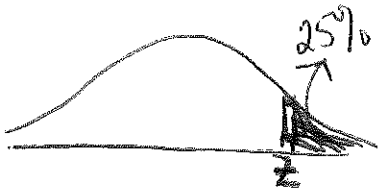
invnorm(.15) $= -1.04$

$z = -1.04$

$-1.04 = \frac{x - 5.9}{1.7}$

$x = 4.14$ days

10) cont'd $\mu = 5.9$
$\sigma = 1.7$



invnorm(.75) = 0.674

$0.674 = \frac{x - 5.9}{1.7}$

$\boxed{x = 7.05 \text{ days}}$

invnorm(.97) = 1.881

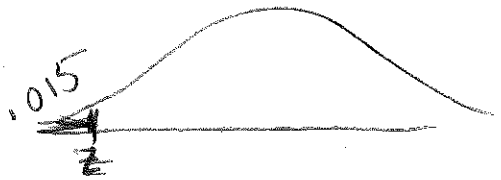
11) a) $\mu = 400$ $\sigma = 100$

$z = 1.881$ $1.881 = \frac{x - 400}{100}$

$x = 588.08$

Minimum score has to be higher than 588.08. You could score a minimum 589 and receive the award of $500.

b)



invnorm(.015) = -2.17

$z = -2.17$ $-2.17 = \frac{x - 400}{100}$

$x = 182.99$

The minimum score you could make and not have to go to summer school is 182.