Intermediate Quant PS 1

1. The standard deviation of the sampling distribution of the sample mean $(\sigma_{\bar{x}})$ =

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{3}{\sqrt{100}} = \frac{3}{10} = \boxed{.3 = \sigma_{\bar{x}}}$$

2. $p = 0.75 \quad \therefore 1-p = 0.25 \quad n = 1200$

normal $\left\{ \mu = p = .75 \right.$ $\quad \sigma^2 = p(1-p) = .75 \cdot 0.25 = .1875$

$$\sigma = \sqrt{.1875} = .4330$$

pop: $1200(.75) = \mu \qquad 1200(.1875) = \sigma^2$

$900 = \mu \qquad 225 = \sigma^2$

People from Suburbs < 270 $\Leftrightarrow$ People from city > 930

$$\Pr(X > 930) = \Pr(X \geq 930.5) \approx 1 - \phi\left(\frac{930.5 - 900}{\sqrt{225}}\right)$$

$$= 1 - \phi\left(\frac{30.5}{15}\right) \qquad z = \frac{30.5}{15} = 2.03$$

$$= 1 - \phi(2.03) = \boxed{.0212}$$

3. $\bar{X} = 156.58$

$s = 22.0687$

$SE = 4.9347$

$\sum (x-\bar{x})^2 = 9740.55$

$/n = 487.0275$

$= s^2$

$s = \sqrt{s^2} = 22.0687$

$s/\sqrt{n} = 4.9347$

X	$(x-\bar{x})^2$	X	$(x-\bar{x}^2)$	X	$(x-\bar{x})^2$
186	849.7225	175	329.4225	131	668.2225
181	538.2225	148	78.3225	149	61.6225
176	366.7225	152	23.5225	135	477.4225
149	61.6225	111	2102.2225	132	617.5225
184	737.1225	141	251.2225		
190	1029.9225	153	14.8225		
158	1.3225	190	1098.9225		
139	318.6225	157	.0225		

3. ~~CI~~ $z: 1.645$

$$CI = \bar{x} \pm z \cdot se$$
$$= (156.85 - 1.645 \cdot 4.9347,\ 156.85 + 1.645 \cdot 4.9347)$$
$$= (148.73324,\ 164.9676)$$

4. t-test done in R: ~~P = 0.5~~ $P = .05402$
Cannot reject H_0

5. Confidence intervals include a significance test by definition, but have the added benefit of showing the magnitude of the effect, which is often important to real-world research.