1. (i) pnorm(200, 500, 0.4) = 0.5194108

$P(Z < 0.0456)$ = pnorm(0.456) = 0.5182

(ii) $\overline{X} \sim$ Binomial(500, 0.4)

$E[x] = np$

$= 500(0.4)$

$= 200$

$var(X) = np(1-p)$

$= 120$

$sd = 2\sqrt{30}$

$P(X < 200.5)$ wl correction

$= P\left(\frac{x-200}{2\sqrt{30}} < \frac{200.5-200}{2\sqrt{30}}\right)$

$= P(Z < 0.0456)$

$= 0.5182$

2). (i) 1 - pbinom(750, 1000, 0.7) = 0.0001985473

1 - pnorm(3.48483) = 0.0002462249

(ii) $P(X > 750)$

$\text{var}(X)\ np(1-p) = 210$

$E(X)\ np = 700$

$$P\left(X > \frac{750.5 - 700}{\sqrt{210}}\right)$$

$$P(Z > 3.48483) \simeq 0.0002$$

3) 6.8 Text

a) point estimate = 0.25

b) $np = 1000 \cdot 0.25$ conditions are met

$= 250 > 10$, expect 10 successes & 10 failures

c) $\alpha = 0.05$

$Z(0.025) = 1.96$

$$p \pm 2 * \sqrt{\frac{p(1-p)}{n}}$$

$$0.25 \pm 1.96 \sqrt{\frac{0.25(1-0.25)}{1000}}$$

$(0.2231616, 0.2768384)$

d) our confidence interval would get bigger

e) our confidence interval would decrease

4) 6.14 Text

a) $p \pm z \sqrt{\frac{p(1-p)}{n}}$

$\alpha = 1 - 0.9$ $\quad z = 1.645$

$= 0.1$

$\frac{\alpha}{2} = 0.05$

$C = 0.48 \pm \sqrt{\frac{0.48 \cdot 0.52}{331}}$

$= 0.48 \pm 1.645 \cdot 0.027$

$= 0.48 \pm 0.044$

$(0.435, 0.526)$

Between 0.435 and 0.526 americans wouldn't go to college

b) $moe = 2 \cdot \sqrt{\frac{p(1-p)}{n}}$

$= 0.015$

$moe = 1.645 \sqrt{\frac{0.48 \cdot 0.52}{n}} = 0.015$

$0.675 = 0.000225$
n

$n = \frac{0.675}{0.000225}$

$n = 3000$

5) 6.16

$p = 61\% = 0.61$

moe $= 0.02$

$\alpha = 1 - 0.95$

$\alpha = 0.05$

$\frac{\alpha}{2} = \frac{0.05}{2} = 0.025$

$z_{\alpha/2} = z_{0.025} = 1.96$

$n = \frac{z_{\alpha/2}^2 \cdot p(1-p)}{\varepsilon}$

$= \left(\frac{1.96}{0.02}\right)^2 \cdot 0.61(0.39)$

$n = 2285$

6)

$z \sqrt{\frac{p(1-p)}{n}}$

$= \sqrt{\frac{0.88(0.12)}{1000}}$

$= 0.01028$

pe: $\frac{880}{1000} = 0.88$

$$moe = 1.28(0.01028)$$

$$= 0.01315$$

$$p = 0.88 \pm 0.01315$$

7) $\left(\frac{1.96}{2(0.02)}\right)^2$ $\quad n \geq$

$$= 2401$$

So, $n \geq 2401$