10.17

a) $H_0: \mu_1 - \mu_2 = 0$ $H_A: \mu_1 - \mu_2 > 0$
or $\mu_1 > \mu_2$

b) Large sample, use Z
$Z_{0.01} > 2.33$

c) $\dfrac{9017 - 5853}{\sqrt{\dfrac{7162^2}{130} + \dfrac{1961^2}{80}}} \approx 4.756$

d) Reject H_0

e) There is significant evidence that Breaststrokers swim more meters/week than Medley-ers.

10.18

$\dfrac{12.20 - 13.20}{2.50} > -2.33 = Z_{0.01}$

No.

10.21

$$z = \frac{1.65 - 1.43}{\sqrt{\frac{0.26^2}{30} + \frac{0.22^2}{35}}} = 3.648 > z_{\frac{0.01}{2}} = 2.576$$

The means ain't equal

10.33 $\quad p_R = .23 \quad\quad p_D = .17 \quad\quad z_{0.05} = 1.645$

$$\hat{p} = \frac{46 + 34}{200 + 200} = \frac{80}{400} = 0.2$$

$$z = \frac{.23 - .17}{\sqrt{\frac{.2 \cdot .8}{100}}} = 1.5 \ngtr 1.645$$

There is not significant evidence that republicans favor the death penalty than democrats at the 0.05 significance level

(0.40 $\quad z_{\frac{.05}{2}} = 1.645$

$$1.645 = \frac{P_1 - P_2 - 0.1}{\sqrt{\frac{P_1(1-P_1)}{n} + \frac{P_2(1-P_2)}{n}}}$$

$$1.645\sqrt{\frac{P_1(1-P_1)}{n} + \frac{P_2(1-P_2)}{n}} \leq (P_1 - P_2)$$

for β,

$$\frac{P_1 - P_2 - 0.1}{\sqrt{\frac{P_1(1-P_1)}{n} + \frac{P_2(1-P_2)}{n}}} \leq z_{0.2} = -0.84$$

$$P_1 - P_2 \leq 0.1 - 0.84 \overbrace{\sqrt{\frac{P_1(1-P_1)}{n} + \frac{P_2(1-P_2)}{n}}}^{S}$$

$0.1 - 0.84S = 1.645S \rightarrow S = 0.04024$

$$0.04024 = \frac{1}{\sqrt{2n}} \longrightarrow \boxed{n = 309}$$

10.43

a) $n = 37$ $\quad \hat{\mu}_1 = 32.19 \quad s_1 = 4.34$

$\hat{\mu}_2 = 31.68 \quad s_2 = 4.56$

$z_{0.05} : 1.65$

$H_0: \mu_1 = \mu_2 \qquad H_A: \mu_1 > \mu_2$

$$z = \frac{32.19 - 31.68 - 0}{\sqrt{\frac{4.34^2}{37} + \frac{4.56^2}{37}}} = 0.49 < z_{0.05}$$

Fail to reject H_0

b) $\beta = P\left(z \le z_{0.05} \mid \mu_1 - \mu_2 = 3\right)$

$$s = \sqrt{\frac{4.34^2}{37} + \frac{4.56^2}{37}} = 1.03$$

$$\frac{\hat{\mu}_1 - \hat{\mu}_2}{s} \le 1.65 \longrightarrow \hat{\mu}_1 - \hat{\mu}_2 \le 1.7076$$

$$P(\hat{\mu}_1 - \hat{\mu}_2 \leq 1.7076 \mid \mu_1 - \mu_2 = 3)$$

$$=$$

$$P\left(Z \leq \frac{1.7076 - 3}{5}\right) = P(Z \leq -1.25)$$

$$= \boxed{0.1056}$$