Please note this is only an outline!

1. skip

2. $n_1 = 12 \quad \bar{x_1} = 85 \quad s_1 = 4$
   $n_2 = 10 \quad \bar{x_2} = 81 \quad s_2 = 5$
   $H_0 : \mu_1 - \mu_2 = 0$
   $H_a : \mu_1 - \mu_2 > 0$
   T. S.

$$\begin{aligned} s_p &= \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}} \\ &= \sqrt{\frac{11 \times 16 + 9 \times 25}{20}} \\ &= \sqrt{20.05} = 4.48 \\ T &= \frac{\bar{x_1} - \bar{x_2} - d_0}{s_p\sqrt{1/n_1 + 1/n_2}} \\ &= \frac{85 - 81 - 0}{4.48\sqrt{1/12 + 1/10}} = 2.086 \\ \nu &= 20 \end{aligned}$$

   R.R. reject H_0 if $T > t_{.05}(20) = 1.725$
   Conclusion: Since the observed $t = 2.086 > 1.725$, reject H_0.

3. $s_1^2 = 2.059 \quad s_2^2 = 0.502$
   $H_0 : \sigma_1^2 = \sigma_2^2$
   $H_a : \sigma_1^2 \neq \sigma_2^2$
   T.S. $F = \frac{s_1^2}{s_2^2} = \frac{2.059}{0.502} = 4.1$
   $\nu_1 = n_1 - 1 = 5, \quad \nu_2 = n_2 - 1 = 4$
   Rejection region: reject H_0 if $F > F_{.025}(5,4) = 9.364$ or $F_{.975}(5,4) = \frac{1}{F_{.025}(4,5)} = 0.135$
   Conclusion: Since $4.1 \in (0.135,\ 9.364)$, we cannot reject H_0.

4.

$$\bar{d} = 4.429 \quad s_d^2 = 5.699 \quad s_d = 2.387$$

   $H_0 : \mu_d = 0$
   $H_a : \mu_d \neq 0$
   T.S.

$$t = \frac{\bar{d} - 0}{s_d/\sqrt{n}} = \frac{4.429 - 0}{2.387/\sqrt{7}} = 4.908$$

   R.R. reject H_0 if $t > t_{.025}(6) = 2.44692$
   Conclusion: reject H_0 at 5% level of significance.

5.

$$\hat{p_1} = \frac{80}{80} = 100\% \qquad \hat{p_2} = \frac{73}{80} = 91.25\%$$

   95% C.I. for success rate p_1

$$\hat{p_1} \pm z_{.025}\sqrt{\frac{\hat{p_1}(1-\hat{p_1})}{n}} \Rightarrow 100\% \pm 1.96 = 100\%$$

95% C.I. for success rate p_2

$$\hat{p_2} \pm z_{.025}\sqrt{\frac{\hat{p_2}(1-\hat{p_2})}{n}} \Rightarrow 91.25\% \pm 1.96 \times \sqrt{\frac{0.9125 \times 0.0875}{80}} \Rightarrow (0.85085,\ 0.9744)$$