Ex 2-1:

H_o : $\mu = 150$ vs H_1 : $\mu > 150$

Population standard deviation σ is given and equal to 3 ($\sigma = 3$)

Hence, the test statistic is given by

$Z = \frac{\overline{y} - \mu_0}{\sigma/\sqrt{n}}$.

$\overline{y} = 148.75$

Computed value ,$z_0 = -0.8333$.

b). The rejection region corresponding to $\alpha = 0.05$(one-sided) is any value of z_0 larger than or equal to 1.645.

Since, the computed value $z_0 = -0.8333$ is not larger than 1.645, do not reject the null hypothesis.

c). P-value is the area to the right of -0.8333 under standard normal curve, which is larger than 0.796.

d). 95% confidence interval on μ :

$$\overline{y} \pm 1.96\sigma/\sqrt{n}$$

which leads to [148.75±1.96 $*$ 1.5].

Ex-2-3

H_o : $\mu = 0.255$vs H_1 : $\mu \neq 150$

Population standard deviation σ is given and equal to 0.0001($\sigma = 3$)

Hence, the test statistic is given by

$Z = \frac{\overline{y} - \mu_0}{\sigma/\sqrt{n}}$.

n=10

$\overline{y} = 0.2545$

Computed value ,$z_0 = 15.81139$

b). The rejection region corresponding to $\alpha = 0.05$(two-sided) is any value of $|z_0|$ larger than or equal to 1.96.

Since, the computed value $z_0 = 15.81139$ is larger than 1.645, reject the null hypothesis.

c). P-value is the area to the right of 15.81139 plus the area to the left of -15.81139 under standard normal curve (in view of two-sided alternative), which is lvery much smaller than 0.001.

d). 95% confidence interval on μ :

$$\overline{y} \pm 1.96\sigma/\sqrt{n}$$

which leads to [0.255±1.96 $*$ 0.00003162278] = [0.255 ±0.00006198064].

Ex2-5:

a). H_o : $\mu = 120$ vs H_1 : $\mu > 120$

b). Population standard deviation σ is unkown. Hence the test statistic is given by

$t = \frac{\overline{y} - \mu_0}{s/\sqrt{n}}$, with n-1 degrees of freedom and n=10.

$\overline{y} = 131$ and s =19.54482

$t_0 = 1.7798$, df = 9. The rejection region at $\alpha = 0.01$ is given by region with any value of t_0 larger (one sided) than 2.821.

Since, the computed value $t_0 = 1.7798$ is not larger than 2.821 do not reject H_0 at α=0.01.

c). One-sided alternative H_1. Hence, the p-value is the area to the right of 1.7798 under student-t curve with 9 d.f which gives p-value = 0.0544.

d). 99 percent confidence interval: [110.914, 151.086].

Ex2-11:2

a). H_0 : $\sigma_1^2 = \sigma_2^2$ vs H_1 : $\sigma_1^2 \neq \sigma_2^2$

Test statistics: $F = \frac{S_1^2}{S_2^2}$. When H_0 is true the distribution of this test statistic is F with $v_1 = 9$ and

$v_2 = 9$.

From the data, s_1^2 =85.822222 and s_2^2 = 87.733333. Since, s_2^2 is larger than s_1^2 we compute $F = \frac{S_2^2}{S_1^2}$ (which guarantees F to be larger than 1).

F_0 =1.022268.

From table, the critical value for $\alpha = 0.05$ of F with $v_1 = 9$ and $v_2 = 9$. is 3.23.

Since the computed value, F_0 is not larger than the critical value, 3.23 do not reject the null hypothesis at 5% level of significance.

p-value is larger than 0.5.

b).$H_0 : \mu_1 = \mu_2$ vs $H_1 : \mu_1 \neq \mu_1$

Test statistic:

$$t = \frac{\overline{y}_1 - \overline{y}_2}{s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where $n_1 = 10 = n_2$ and s_p is the pooled standard deviation (see equation 2-25 in your text)

$t_0 = 0.048$, with df = 18, p-value = 0.9622.

Do not reject H_0 at 5% level of significance.

Ex2-12

a) and b). $H_0 : \mu_1 = \mu_2$ vs $H_1 : \mu_1 \neq \mu_1$

Test statistic:

$$t = \frac{\overline{y}_1 - \overline{y}_2}{s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where $n_1 = 6 = n_2$.

t = -1.3498, df = 10, p-value = 0.2068

For $\alpha = 0.05$ do not reject H_0.

c).$H_0 : \sigma_1^2 = \sigma_2^2$ vs $H_1 : \sigma_1^2 \neq \sigma_2^2$

s_1^2 =0.674667 and s_2^2 =0.577667

F_0 =1.167917 with $v_1 = 5$ and $v_2 = 5$

The critical value at $\alpha = 0.05$, is 5.05. Hence, do not reject H_0.

P-value is given by the area to right of 1.167917 under F-curve with $v_1 = 5$ and $v_2 = 5$ which is larger than 0.5 and hence do not reject H_0.