Q 32
P 364
part B

$n_1 = 28$ $n_2 = 16$

$\bar{X}_1 = 801$ $\bar{X}_2 = 780$

$S_1 = 117$ $S_2 = 72$

We have at least one small sample so use t-table

$H_0: \mu_1 - \mu_2 = 0 \rightarrow \delta_0$

$H_a: \mu_1 - \mu_2 > 0$

$\alpha = 0.05$

So we have a one-tailed test. We may use critical values or P-values for this test

Test statistic

$$t_{calc} = \frac{(\bar{X}_1 - \bar{X}_2) - \delta_0}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

with degrees of freedom

$$\nu = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1-1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2-1}}$$

rounded down to nearest integer

OR

$$\nu = \min(n_1-1, n_2-1)$$

So,

$$t_{calc} = \frac{(801-780)-0}{\sqrt{\frac{117^2}{28} + \frac{72^2}{16}}}$$

$$= 0.7365 \longrightarrow$$ if you like p-values, you may find it from table at relevant df.

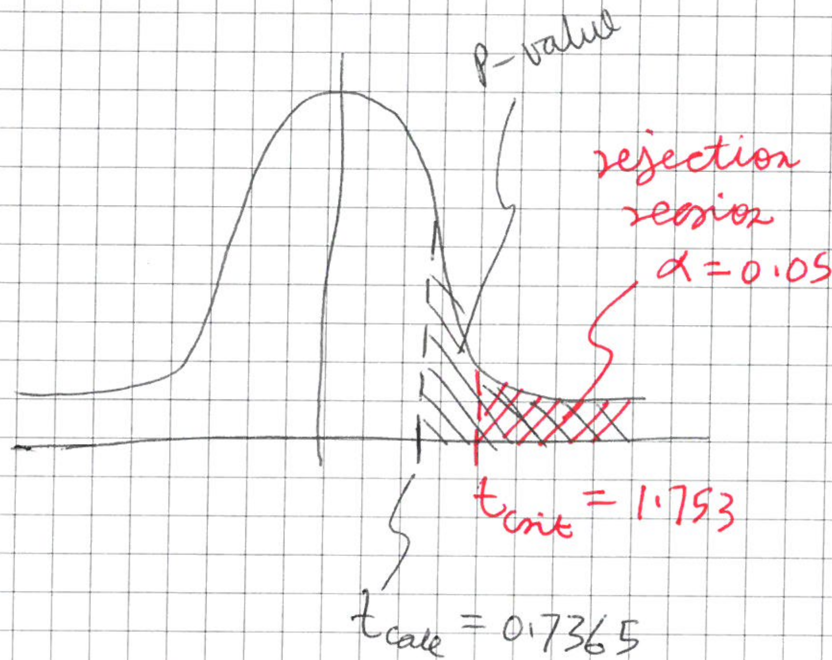
Now

$$\nu = \min(28-1, 16-1)$$

$$= 15$$ degrees of freedom

$$t_{crit} = t_{\alpha = 0.05,\, \nu = 15\,df}$$

$$= 1.753$$



So our t_{calc} does not fall in rejection region.

So we cannot reject the null hypothesis.

So the average stance duration of the older patients and younger patients with this disease are the same.

Q 40
P.373
Part a.

So this is a Hypothesis Test Concerning Two Means. However we have $n_1 = n_2$, and the same test subjects were used in the 'before' and 'after'. So we may use the Matched Pair Comparison method.

Test Subject	Lactation (X_1)	Post Wean. (X_2)	$D_i = X_2 - X_1$
1	1928	2126	198
2	2549	2885	336
3	2825	2895	70
4	1924	1942	18
5	1628	1750	122
6	2175	2184	9
7	2114	2164	50
8	2621	2626	5
9	1843	2006	163
10	2541	2627	86

$\bar{D} = 105.7$

$S_D = 103.845$

So we can test the D_i column.

We have essentially reduced this 2-sample hypothesis test to a 1-sample hypothesis test.

$$H_0: \mu_D = 25 \sim \mu_{D,0}$$

$$H_a: \mu_D > 25$$

$$\alpha = 0.05$$

So this is a one tail test (on the upper end) and we have $n = 10$ which is a small sample $\rightarrow$ use t-table.

For one-tail test we may use critical values or p-values.

Test statistic

$$t_{calc} = \frac{\bar{D} - \mu_{D,0}}{S_D / \sqrt{n}}$$

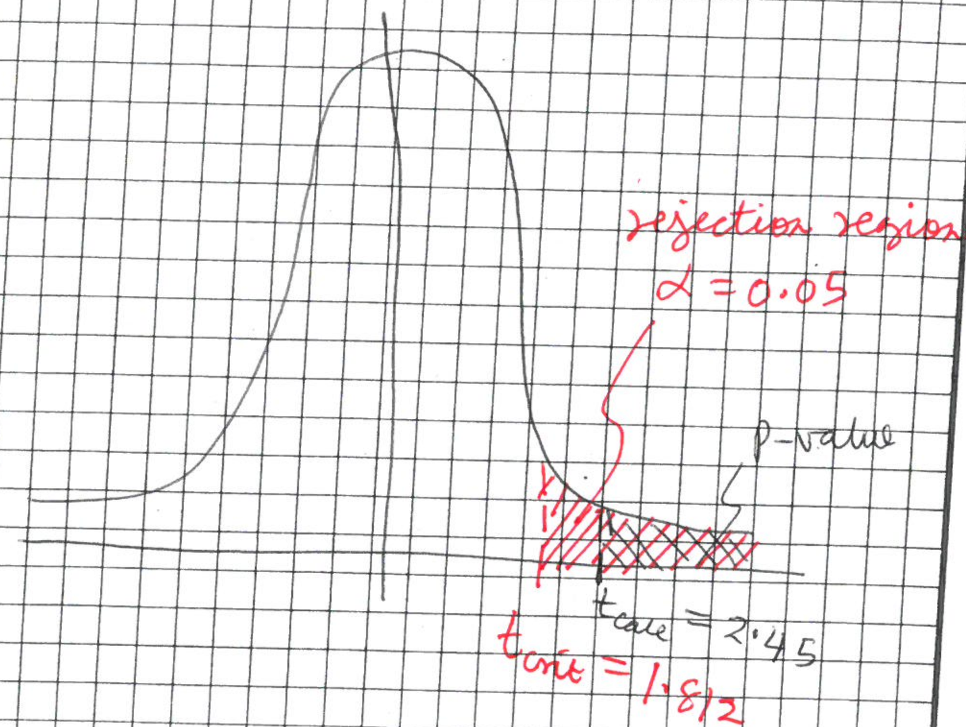
$$= \frac{105.7 - 25}{103.85 / \sqrt{10}}$$

$$= 2.45$$

Now

$$t_{crit} = t_{\alpha = 0.05,\ \nu = 9\,df}$$

$$= 1.812$$



So we are stuck in rejection region.

Reject H_0!

So the average bone mineral content during post weaning does indeed exceed that of lactation period by 25g.