5.1.1

The Employment and Training Administration reported that the U.S. mean unemployment insurance benefit was $238 per week (The World Almanac, 2003). A researcher in the state of Virginia anticipated that sample data would show evidence that the mean weekly unemployment insurance benefit in Virginia was below the national average.

a) Develop appropriate hypotheses such that rejection of H0 will support the researcher's contention.

$$H_0 = \mu \geq \mu_l$$
$$H_\alpha = \mu < \mu_l$$

b) For a sample of 100 individuals, the sample mean weekly unemployment insurance benefit was $231 with a sample standard deviation of $80. What is the p-value?

$$s = 80$$
$$\mu = 238$$
$$\bar{x} = 231$$
$$n = 100$$
$$s_{\bar{x}} = \frac{s}{\sqrt{n}}$$
$$s_{\bar{x}} = \frac{80}{\sqrt{100}}$$
$$s_{\bar{x}} = 8$$
$$t = \frac{\bar{x} - \mu}{s_{\bar{x}}}$$
$$t = \frac{231 - 238}{8}$$
$$t = -0.875$$
$$p - value = 0.19184589$$

c) At $\alpha = .05$, what is your conclusion?

As the $p - value$ is greater than 0.05, we cannot reject H_0

d) Repeat the preceding hypothesis test using the critical value approach.

$$t = -0.875$$
$$\text{critical value}(t_0) = -1.66039115$$

As $t < t_0$ does not hold, we cannot reject h_0

5.1.2

A shareholders' group, in lodging a protest, claimed that the mean tenure for a chief executive office (CEO) was at least nine years. A survey of companies reported in The Wall Street Journal found a sample mean tenure of $\bar{X} = 7.27$ years for CEOs with a standard deviation of $s = 6.38$ years (The Wall Street Journal, January 2, 2007).

a) Formulate hypotheses that can be used to challenge the validity of the claim made by the shareholders' group.

$$H_0 = \mu \geq 9$$
$$H_\alpha = \mu < 9$$

b) Assume 85 companies were included in the sample. What is the p-value for your hypothesis test?

$$s = 6.38$$
$$\mu_0 = 9$$
$$\bar{x} = 7.27$$
$$n = 85$$
$$s_{\bar{x}} = \frac{s}{\sqrt{n}}$$
$$s_{\bar{x}} = \frac{6.38}{\sqrt{85}}$$
$$s_{\bar{x}} = 0.692008160441513$$
$$t = \frac{\bar{x} - \mu_0}{s_{\bar{x}}}$$
$$t = \frac{7.27 - 9}{0.692008160441513}$$
$$t = -2.49997051898381$$
$$p - value = 0.007182545042323$$

c) At $\alpha = .01$, what is your conclusion?

As the $p - value$ is less than 0.01, we can reject H_0, which means that the CEO's mean tenure is less than 9 years

5.1.3

The Coca-Cola Company reported that the mean per capita annual sales of its beverages in the United States was 423 eight-ounce servings (Coca-Cola Company website, February 3, 2009). Suppose you are curious whether the consumption of Coca-Cola beverages is higher in Atlanta, Georgia, the location of Coca-Cola's corporate headquarters.

A sample of 36 individuals from the Atlanta area showed a sample mean annual consumption of 460.4 eight-ounce servings with a standard deviation of $s = 101.9$ ounces.

Using $\alpha = .05$, do the sample results support the conclusion that mean annual consumption of Coca-Cola beverage products is higher in Atlanta?

$$
\begin{aligned}
H_0 &= \mu \leq 423 \\
H_\alpha &= \mu > 423 \\
s &= 101.9 \\
\mu_0 &= 423 \\
\bar{x} &= 460.4 \\
n &= 36 \\
s_{\bar{x}} &= \frac{s}{\sqrt{n}} \\
s_{\bar{x}} &= \frac{101.9}{\sqrt{36}} \\
s_{\bar{x}} &= 16.9833333333333 \\
t &= \frac{\bar{x} - \mu_0}{s_{\bar{x}}} \\
t &= \frac{460.4 - 423}{16.9833333333333} \\
t &= 2.20215897939156 \\
p - value &= 0.01716737427853
\end{aligned}
$$

As the $p - value$ is less than 0.05, we can reject H_0, which means that the Coke consumption it's higher in Atlanta than in the rest of the USA