Stat 3011 Midterm 2 (Computer Part)

Problem 1

(a)

```
Rweb:> 1 - pt(2.0, 5)
[1] 0.05096974
```

(b)

```
Rweb:> 1 - pt(10.0, 5)
[1] 8.547379e-05
```

The computer's answer means 8.547379×10^{-5} or 0.00008547379.

(c)

```
Rweb:> 2 * (1 - pt(2.0, 5))
[1] 0.1019395
```

(d)

```
Rweb:> qt(1 - 0.15, 5)
[1] 1.155767
```

This could also be looked up in the table of t critical values (Appendix A6 in Wild and Seber) in the column headed .15 under 5 df.

(e)

```
Rweb:> qt(1 - 0.15 / 2, 5)
[1] 1.699363
```

This cannot be looked up in Appendix A6 in Wild and Seber, because there is no column headed .075.

Problem 2

(a) You want either a dot plot or a stem and leaf plot. They show pretty much the same thing. A histogram is fairly useless with only 15 data points. The stem and leaf plot is

```
Rweb:> stem(height)

  The decimal point is 1 digit(s) to the right of the |

  15 | 3479
  16 | 044567
  17 | 46
  18 | 299
```

(b)

```
Rweb:> t.test(height)

         One Sample t-test

data:  height
t = 56.6738, df = 14, p-value = < 2.2e-16
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 161.6101 174.3233
sample estimates:
mean of x
 167.9667
```

The confidence interval (161.6101, 174.3233) calculated by R, should according to the rules in Section 7.4.3 in Wild and Seber be rounded to one more significant figure than the width of the interval. That's the units place here, giving (162, 174) for the rounded interval.

(c) Maybe. It's hard to tell with only 15 data points. We need the population to be normal for the t distribution to be correct. The stem and leaf plot doesn't look exactly normal, but then no sample would (the sample is not the population). The population might be a bit skewed, but doesn't appear to be highly skewed. The confidence interval is probably o. k.

(d)

```
Rweb:> t.test(height, conf.level=0.99)

         One Sample t-test

data:  height
t = 56.6738, df = 14, p-value = < 2.2e-16
alternative hypothesis: true mean is not equal to 0
99 percent confidence interval:
 159.1441 176.7893
sample estimates:
mean of x
 167.9667
```

As in part (b), the confidence interval (159.1441, 176.7893) calculated by R should be rounded to (159, 177).

Problem 3

```
Rweb:> prop.test(c(213,194), c(250,250))
```

```
        2-sample test for equality of proportions with continuity correction

data:  c(213, 194) out of c(250, 250)
X-squared = 4.2799, df = 1, p-value = 0.03856
alternative hypothesis: two.sided
95 percent confidence interval:
 0.004113909 0.147886091
sample estimates:
prop 1 prop 2
 0.852  0.776
```

The confidence interval (0.004113909, 0.147886091) calculated by R, should according to the rules in Section 7.4.3 in Wild and Seber be rounded to one more significant figure than the width of the interval. That's the second decimal place here, giving (0.00, 0.15) for the rounded interval. However, since people often make a big deal out of whether the confidence interval includes zero or not, in this case it is probably better not to round quite so much and leave it as (0.004, 0.148).