Stat 3011 Midterm 1 (Computer Part)

Problem 1

(a)

```
Rweb:> 1 - pnorm(325, mean=250, sd=50)
[1] 0.0668072
```

(b)

```
Rweb:> pnorm(275, mean=250, sd=50) - pnorm(200, mean=250, sd=50)
[1] 0.5328072
```

(c)

```
Rweb:> qnorm(0.35, mean=250, sd=50)
[1] 230.7340
```

Problem 2

(a) You want either a histogram or a stem and leaf plot. They show pretty much the same thing. The histogram is just prettier. The R default stem and leaf plot is

```
Rweb:> stem(fred)

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

   0 | 688889
   1 | 0133334445556777888999 9
   2 | 00011111223333444444566677778888999999
   3 | 000011112333333344555555666677899
   4 | 0001234455666888999
   5 | 0011112222233444556
   6 | 011224456778
   7 | 01223345556779
   8 | 01444589
   9 | 0001345
  10 | 68
  11 | 24589
  12 | 011599
  13 | 002
  14 | 0455
  15 | 9
  16 | 0
```

(b) Skewed. Long right tail (positive skewness). Unimodal. Maybe some outliers, but this is better described as just the long right tail.

If you want to argue that the distribution is bimodal or even trimodal because there are fewer values in the 10 and 13 bins than the ones on either side, that's o. k. Usually we ask for clearer evidence of multimodality than this because the histogram or stem and leaf are often as multimodal as this when the population is unimodal. But there's no way to tell for sure.

(c)

```
Rweb:> mean(fred)
[1] 51.12525
```

(d)

```
Rweb:> median(fred)
[1] 40
```

(e)

```
Rweb:> sd(fred)
[1] 34.95533
```

(f)

```
Rweb:> IQR(fred)
[1] 44.7625
```

(g) The mean goes with the standard deviation like ham and eggs. Similarly the median goes with the IQR.

Thus one sensible answer is mean (estimate of center) and standard deviation (estimate of spread). And another sensible answer is median (estimate of center) and IQR (estimate of spread). An argument can be made for either of these. No argument can be made for any other answer.

Of the two answers, median and IQR is a bit better. The median is a better, more natural, measure of center of a skewed distribution.

Problem 3

(a)

```
Rweb:> pnorm(31, mean=21.0, sd=4.7)
[1] 0.9833173
```

(b)

```
Rweb:> 1 - pnorm(31, mean=21.0, sd=4.7)
[1] 0.01668266
```