```
i.lm <- lm(happiness ~ income)
summary(i.lm)

##
## Call:
## lm(formula = happiness ~ income)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -18.18  -6.52   2.07   7.47  13.31
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -5.82e+03   7.17e+02   -8.11  2.0e-07
## income       3.82e-01   4.48e-02    8.54  9.6e-08
##
## Residual standard error: 9.23 on 18 degrees of freedom
## Multiple R-squared:  0.802,Adjusted R-squared:  0.791
## F-statistic: 72.9 on 1 and 18 DF,  p-value: 9.59e-08
```

```
ic.lm <- lm(happiness ~ o.caff+income)
summary(ic.lm)

##
## Call:
## lm(formula = happiness ~ o.caff + income)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -14.292  -5.980  -0.611   5.644  13.513
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1.08e+04   3.05e+03   -3.53   0.0026
## o.caff      -1.68e+00   1.01e+00   -1.66   0.1143
## income       7.12e-01   2.03e-01    3.51   0.0027
##
## Residual standard error: 8.81 on 17 degrees of freedom
## Multiple R-squared:  0.83,Adjusted R-squared:  0.81
## F-statistic: 41.4 on 2 and 17 DF,  p-value: 2.92e-07
```

1. Write out the estimated regression line for the linear model of happiness on income and caffeine.

2. Interpret the estimate for the coefficient on income in the linear model of happiness on income and caffeine.

3. Use the following plots to assess the assumptions for the multiple linear regression model.

Scatterplot matrix of Happiness Data
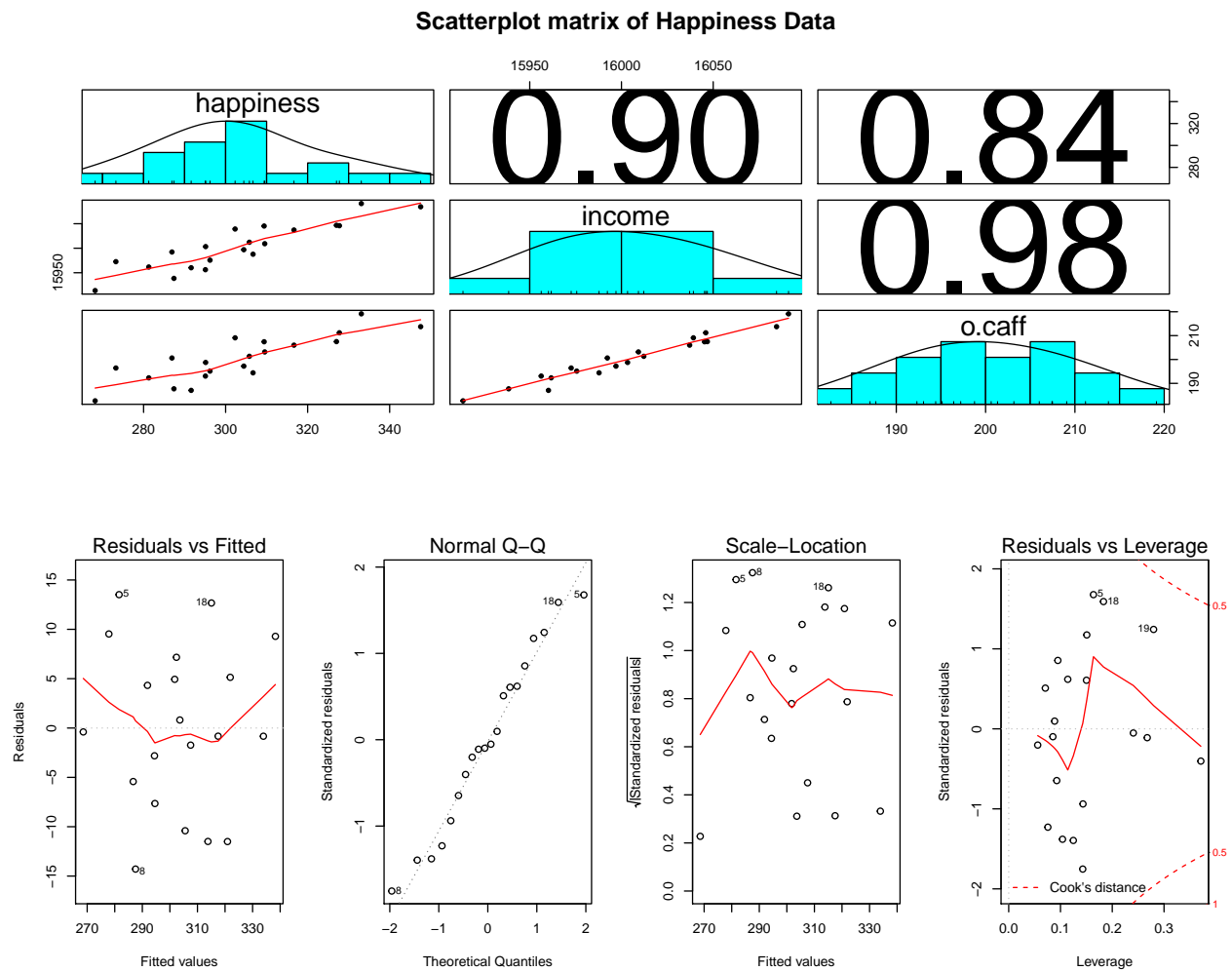
4. What was the standard error for the coefficient on income in the simple linear regression model?

5. What is the standard error for the coefficient on income when both caffeine and income are in the model?

6. Based off the two previous questions, calculate $\sqrt{VIF}$ for the coefficient on income. Then, find $VIF_{caffeine}$.

7. Below is the VIF calculated by R. Does this match up, roughly, with what you found? There may be some rounding error.

```
require(car)
vif(ic.lm)[2]

## income
##   22.5
```

8. List three ways to detect multicollinearity in your model.