In this lab we want to see what happens to $R^2$, SSE, and $s_e$, as we increase the complexity of the regression model used to fit the data. To that end, first run the following lines of code to make some data on $x$ and $y$:

```r
set.seed(123) # To assure all students get the same answers.
n = 100 # Sample of size 100.
x = runif(n,-1,1) # Let x be from a uniform dist between -1 and +1.
y = 2 + 3*x + rnorm(n,0,1) # Let y be linearly related to x plus some Normal error.
plot(x,y) # You can see the linear relationship.
```

a) Now, write code to fit a simple linear regression model to the data, treating $x$ as independent variable (or predictor) and $y$ as dependent variable (or response). Write code to extract the values of $R^2$, SSE, and $s_e$; this step of being able to extract the values from summary(lm.1) is important for part b; it is not sufficient to just look them up in the outputs.

Hints:
- The prelab tells you how to extract the value of $R^2$ from summary(lm.1); it’s summary(lm.1)$r.squared. Use the same method but extract the value of $s_e$. If you run the following command
  ```r
  names( summary(lm.1) )
  ```
you will see that $s_e$ is called sigma.
- The prelab also shows you how to compute the value of SSE. For the purpose of part b, it is best if you compute it from the defining formula by summing over the square of the errors ($y_i - \hat{y}_i$).

b) Write code to also perform a quadratic regression, a cubic regression, ..., and a 5th order polynomial regression. Save the values of $R^2$, SSE, and $s_e$ for the 5 regression models (including the linear regression of part a), and plot/graph each of them (i.e., $R^2$, SSE, and $s_e$) as a function of integers 1 through 5.

Note: This cannot be done with a for-loop, and so it will require some cutting/pasting.

c) What pattern(s) do you see in each of the three plots?