1. What is the relationship of covariance and the correlation coefficient? (3pts)

**Correlation is covariance simply re-normalized so that it is between -1 and 1.**

1. Write down the basic regression equation with 3 independent variables. Explain each term in the equation. (4pts)

**The y term is the dependent variable, this is the variable whose variance we are trying to explain.**

**The b\_0 is the baseline value y would have if all the x’s were 0.**

**The x’s and their associated betas are the other variables whose which will be used to explain y, the beta is their linear effect.**

**The epsilon, is everything our model will not be able to explain, the non captured portion of y.**

1. Suppose our independent variables are highly correlated (but not perfectly). What are the effects of this? (2pts)

**Highly correlated variables reduce the efficiency of the estimation, this might cause our variables to not be significant, that is, the required sample to reliably measure will increase.**

1. Suppose we expect that movies that are directed by Quentin Tarantino earn more money than other movies. How do we measure this effect in a regression model? (2pts)

**Create a dummy variable which takes the value 1 if they are directed by Tarantino and 0 if directed by everybody else. The beta coefficient on this variable will be the unique effect of Tarantino**

1. How do we capture the non-linear effects of time in a model? Explain how to interpret the coefficients(2pts)

**If for example we have age in the model, we can include age and age squared in the model so that we can see the non linear effects. Positive-Positive means that age has a positive and increasing effect, positive negative means that the initial effect is positive but eventually it becomes negative.**

1. Give 3 causes of bias (3pts)

**Omitted variable bias or Backdoor**

**Misspecification**

**Poor measurement of x**

1. Give 3 vectors of control that we would need if we were trying to measure the effect of 1 on 2: (4pts)

**3, 34, 35, 345**

