EPPS6313 Recitation Session (21, 22 Apr) by Young Joon Oh

Ⅰ. Short Review

1. Covariance and Correlation

   - Covariance : If large value of X will go with large value of Y, and vice versa, the covariance will be positive. Cov(x,y) = $\frac{\sum(x-\bar{x})(y-\bar{y})}{N-1}$.

   - Correlation : In addition to telling you whether variables are positively or inversely related, correlation also tells you the degree to which the variables tend to move together. Pearson's r = $\frac{SP}{\sqrt{SS_x \times SS_y}}$.

   - Test correlation : H_0 : ρ(the population correlation) = 0, t = $\frac{r-\rho}{\sigma_r}$, $\sigma_r = \sqrt{\frac{1-\rho^2}{N-2}}$.
     Dof : N-2, r^2 : PRE interpretation.

   - Partial correlation : $r_{xy.z} = \frac{r_{xy} - r_{xz}r_{yz}}{\sqrt{1-r_{xz}^2}\sqrt{1-r_{yz}^2}}$.

2. Regression.

   - Regression(OLS) requires only linear in parameter, but Correlation requires linear in variable as well.

   - $Y = \alpha + \beta X + u$ (Population Regression Function), Y = a + bX + e (SRF)
     $\hat{Y} = a + bX \therefore Y = \hat{Y} + e$.

   - OLS(Ordinary Least Squares) estimator for β
     $b = \frac{SP}{SS_x}$, $a = \bar{Y} - b\bar{X}$.
     b : In the sample, on average when 1 unit of X ↑ , b of Y change.
     Test : $t = \frac{b-\beta}{\sigma_\beta}$, $\sigma_\beta = \sqrt{\frac{S^2}{SS_x}}$.

Ⅱ Problems

1. Calculate covariance and correlation

Cigarettes(X)	Lung Capacity (Y)
0	45
5	42
10	33
15	31
20	29

2. Make a regression equation

3. If someone smokes 30 Cigars, what is your predicted lung capacity?