Econ 3040 – Midterm 2 Formula Sheet

population linear regression model with one regressor	$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i, \qquad i = 1, \dots, n$
OLS estimator of the slope (β_1)	$b_1 = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sum_{i=1}^{n}(X_i - \bar{X})^2}$
OLS estimator of the intercept (β_0)	$b_0 = \bar{Y} - b_1\bar{X}$
OLS predicted values	$\hat{Y}_i = b_0 + b_1 X_i$
OLS residuals	$e_i = Y_i - \hat{Y}_i$
explained sum of squares	$ESS = \sum_{i=1}^{n}\left(\hat{Y}_i - \bar{Y}\right)^2$
total sum of squares	$TSS = \sum_{i=1}^{n}(Y_i - \bar{Y})^2$
sum of squared residuals	$RSS = \sum_{i=1}^{n} e_i^2$
regression R^2	$R^2 = \frac{ESS}{TSS} = 1 - \frac{RSS}{TSS}$
t-statistic for testing β_1	$t = \frac{b_1 - \beta_{1,0}}{s.e.(b_1)}$
95% confidence interval for β_1 (for large n)	$b_1 \pm 1.96 \times s.e.(b_1)$
adjusted R-square ($\bar{R}^2$)	$\bar{R}^2 = 1 - \frac{RSS}{TSS}\left(\frac{n-1}{n-k-1}\right)$
F-statistic	$F = \frac{(RSS_R - RSS_U)/q}{RSS_U/(n - k_U - 1)}$
F-statistic	$F = \frac{(R_U^2 - R_R^2)/q}{(1 - R_U^2)/(n - k_U - 1)}$