

Quiz 1, Grading Rubric

Task	Points
<i>Question 1</i>	
Set up the initial, theoretical total cost function, $TC = \text{Misery} + \text{Gas}$	2
Set up the total cost function in terms of the variable of interest, s : $TC = \frac{40d}{s} + \frac{4d}{s-0.015s^2}$	5
Solved for the first-order condition, $\frac{dTC}{ds} = \frac{-40d}{s^2} - \frac{4d(1-0.03s)}{(s-0.015s^2)^2} = 0$	5
Simplified the first-order condition to, $11 - 0.33s - 0.00225s^2 = 0$	5
Used quadratic formula to solve for the two roots of $s = (51.11, 95.55)$	3
Solved for the second-order condition, $\frac{d^2TC}{ds^2} = \frac{80d}{s^3} + 4d \left[\frac{2(1-0.03s)^2 + 0.03(s-0.015s^2)}{(s-0.015s^2)^3} \right]$	3
Verified that $s = 51.11$ is the speed at which $\frac{d^2C}{ds^2} > 0$	2
<i>Question 2</i>	
Made fewer than 2 spelling/grammar errors in the discussion	3
Thoughtfully discussed the concept that there are two ways to describe relationships among random variables (correlation and causation) and that in the majority of cases, we can only estimate correlations. However, correlations do not imply causation, so the interpretation of the correlation results must be made with greater understanding.	12
<i>Question 3</i>	
Part (a)	
Correctly calculated the sample mean of each variable, $\overline{\text{Return}} = \$1,120$ and $\overline{\% \text{Barley}} = 0.15$	2
Correctly calculated the covariance between the two variables, $\text{Cov}[\text{Return}, \% \text{Barley}] = 3.75$	5
Either calculated the standard deviation for each variable or used the given information to calculate the standard deviation, $S_{\text{Return}} = 83.67$ and $S_{\% \text{Barley}} = 0.05$	3

Task	Points
Correctly calculated the correlation, $\rho_{\text{Return, \%Barley}} = 0.89$	2
Correctly specified null hypothesis, $H_0 : 0.89 - 0 = 0$	/ 2
Correctly specified alternative hypothesis, $H_a : 0.89 > 0$	/ 2
Correctly solved for $t_{\text{stat}} = 0.89 \sqrt{\frac{5-2}{1-0.89^2}} = 3.50$	/ 3
Correctly identified t_{crit} (1-tailed, $\alpha=0.05$, $\text{df}=5-2=3$) = 2.35	/ 3
Correctly determined that $t_{\text{stat}} > t_{\text{crit}}$	/ 1
Correctly interpreted that the null hypothesis that $\rho > 0$ <i>is rejected</i> in favor of the alternative	/ 2
 Part (b)	
Correctly calculated the sample mean of returns, $\overline{\text{Return}} = \$1,120$	2
Either calculated the standard deviation for returns or used the given information to calculate the standard deviation, $S_{\text{Return}} = 83.67$	3
Correctly calculated the coefficient of variation, $CV_{\text{Return}} = 0.07$	5
Correctly specified null hypothesis, $H_0 : 0.07 - 0.12 = 0$	/ 2
Correctly specified alternative hypothesis, $H_a : 0.07 < 0.12$	/ 2
Correctly solved for $t_{\text{stat}} = \frac{0.07-0.12}{83.67/\sqrt{5}} = -0.001$	/ 4
Correctly identified t_{crit} (1-tailed, $\alpha=0.10$, $\text{df}=5-1=4$) = 1.533	/ 3
Correctly determined that $ t_{\text{stat}} < t_{\text{crit}}$	/ 1
Correctly interpreted that the null hypothesis that $\rho > 0$ <i>cannot be rejected</i> in favor of the alternative	/ 3
 Part (c)	
Made fewer than 2 spelling/grammar errors in the discussion	3
Discussed the decision based on your results in parts (a) and (b) and used solid economic reasoning. For example, because you found that higher returns were associated with higher barley proportions and that there was no difference in the level of riskiness in the returns, you would consider strategies that increase the proportion of barley in cattle feed.	7