Wilf Csaplar Jr. Economics 205 Homework #10 **Due Monday 4/20 by 11:00 AM**

Do NOT write your name anywhere. (Canvas will tell me who turned in the assignment.) Take pictures of your answers and use your own software or https://pdfcandy.com/ to create a single PDF. (pdfcandy.com will convert JPG to PDF, resize PDF, merge PDF and just about anything else you can think of with a PDF for free.) Upload that to Canvas. Failure to follow these directions will cost you 10 points.

Show all work for all questions.

1) (5 points each) Suppose your utility function for food, clothing, and music, is given by $U(C, F, M) = 8\ln(CM) + 12F^{1/2} + 9(FM)^{1/3}$. Find the requested functions.
A) $\partial U/\partial C$
B) U'_F
C) U'_3
D) $\frac{\partial^2 U}{\partial M \partial F}$

2) (20 points) Suppose the utility function for guns (G), masks (M), and toilet paper (T) is given by: $U(G, M, T) = 8G^{1/2} + (4M+2T)^{1/2}$. Find the gradient, ∇U, and the Hessian, $H(U)$ or $\nabla^2 U$.

3) (15 points) Suppose your utility function of masks and toilet paper is $U(M, T) = 4M^{\alpha}T^{\beta}$. Here, α and β are constants. Find the marginal utility of masks, MU_M, and the marginal utility of toilet paper, MU_T. Find the slopes of the two marginal utility functions. What values would be acceptable values for α and β if we wanted the marginal utility to be positive and we wanted decreasing marginal utility? Explain how you reached your conclusion.

4) (20 points) Suppose the utility function for guns (G), masks (M), and toilet paper (T) is given by: $U(G, M, T) = 9(G+2M+3T)^{1/3}$. Find the gradient, ∇U, and the Hessian, $H(U)$ or $\nabla^2 U$.

5) (5 points) We know that the equation for an indifference curve is given by $U(X, Y) = c$. Find the equation for the slope of the indifference curve. Briefly describe how you reached your conclusion. (One of you should know the end result from ECON 301 this semester and one of you should know the end result from ECON 360 this semester.)

6) (20 points) Suppose the utility function for guns (G), masks (M), and toilet paper (T) is given by: $U(G, M, T) = \ln(G^{1/2}MT)$. Find the gradient, ∇U, and the Hessian, $H(U)$ or $\nabla^2 U$.