Wilfrid W. Csaplar Jr., Ph.D. Economics 205 Exam #1 2017/2/20

Write your name on the cover of the test booklet and nowhere else. Enclose this sheet with the booklet. Failure to follow these directions will cost you 1 point. The test has 100 points (to be scaled up to 170 points) and is scheduled to take 50 minutes. Therefore, expect to spend 1 minute for every 2 points. For example, a 12-point question should take 6 minutes. I cannot give extra time because some students have a class after your class.

1) (6 points) For EITHER profits OR marginal revenue, determine the dimension (a.k.a. units) of that variable. Briefly state how you reached your conclusion.

2) (8 points) Draw EITHER $X<8$ OR $7\geq X>3$. State what you did and why you did it.

3) (10 points) Answer EITHER Part A OR Part B.
A) Find the distance between (4, 2, -1) and (-4, 1, 3). Show all work.
B) Plot the point (4, 2, -1).

4) (10 points) Find $\lim_{n\to\infty} a_n$ for EITHER $a_n = \frac{4n^2 + 3n - 2}{2n^2 + 3}$ OR $a_n = \frac{8n^2 + 5}{3n^3 + 17}$ show all work and briefly state what you did.

5) (12 points) Answer EITHER Part A OR Part B.
A) For both population and your credit card balance, would discrete or continuous compounding be applicable? Explain your logic.
B) Give an example of a function which is monotonically decreasing and bounded. Explain how you know it fits both parts of the definition.

6) (16 points) Answer ONE of the three questions.
A) Suppose you bought a bond for $20,100. It has a face value of $20,000, a coupon rate of 4%, with interest paid quarterly. It will mature in 7 ½ years. Set up the equation which could be used to calculate the internal rate of return. State how you know what goes where in each part of the equation. Use the big PV equation which has fractions inside of a fraction. Do not solve the equation.
B) Suppose you are one year from graduation. You are trying to decide if you should come back next year. Next year's tuition etc. will be $40,000. If you get a job without graduating, you will earn $30,000 a year for the rest of your working career. If you get your degree, you will earn $35,000 a year for the rest of your career. You will work for 44 years if you start now and 43 years if you wait until you graduate. For simplicity, because the tuition payments are semi-annual, assume all payments are semi-annual. Set up the equation which would be able to calculate the return on your last year of college. State how you know where to put the numbers. You do not need the big PV equation with the fractions inside of a fraction, but you can use it.
C) In *Principles of Macroeconomics*, we had a consumption function of $C = 100 + MPC*(Y-T)$. Assume that taxes are 0. Let a_n be the additional spending done by the n^{th} person. So, for example, if somebody earned \$100, a_1 would be 100*MPC, Then, whoever earned that money would be $a_2 = a_1*MPC$. Therefore, s_n is the geometric series which is the total additional spending by the first n people. Use this information, and the information we learned about the geometric series to find $\lim_{n\to\infty} s_n$. Hint: I am asking you to prove the formula we developed for the government spending multiplier.

7) (18 points) Answer EITHER Part A OR Part B.
A) Draw a Venn Diagram where the universal set is Bethany College students. Draw areas to represent

sports fans (S), and a second area for Pirate fans (F). Draw the area $S \cap F$. What percentage of U is that? What is the interpretation of the area $S \cap F$? BRIEFLY explain how you found the size of $S \cap F$.
B) Draw a Venn Diagram where the universal set is Bethany College students. Draw areas to represent Democrats (D), and a second area for Juniors (J). Draw the area $D \cup J$. What percentage of U is that? What is the interpretation of $D \cup J$? BRIEFLY explain how you found the size of $D \cup J$.

8) (20 points) Answer EITHER Part A OR Part B.
A) Suppose we had a Cobb-Douglas utility function $U(\text{Hats, Coats}) = H^{1/2}C^{1/2}$. Find four points for the level curve for $U(H,C) = 4$ and use them to draw the whole curve. Show all work. Given your graph, is the utility function quasi-concave, quasi-convex, or neither? Explain your logic. (I realize that the exponents should total to <1, but this makes the mathematics easier.)
B) Draw the function $F(X) = X^{1/2}$ over the domain $\{x \in \Re_+ : x<16\}$. Is your function invertible? Explain your logic. If it is, then find the inverse. If it is not invertible, tell me if it is strictly concave, concave, convex, or strictly convex. Explain your logic.