

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.

SHOW ALL WORK ON ALL PARTS

1) (6 points) For EITHER marginal revenue OR unemployment rate. Determine what the units, a.k.a. dimension is. Briefly explain how you got your answer.

2) (8 points) For EITHER the accumulated rainfall OR your savings account's interest, is it compounded discretely or continuously? Explain your logic.

3) (12 points) Find the limit of EITHER the sequence in Part A OR the sequence in Part B.

$$A) f(n) = \frac{3n^2 + 5n}{6n^2 + 10} + 7n$$

$$B) f(n) = \frac{5n + 7n^2}{3 + 5n + 7n^3} + n$$

4) (16 points) Answer EITHER Part A OR Part B.

A) Find the distance between (4, 8, -2, -1, 7) and (9, 3, -5, 1, 6). Show all work.

B) Plot both intervals (-2, 7] and $8 \geq X$. Determine if they are compact. Explain your logic.

5) (18 points) Plot EITHER the sequence in Part A OR the sequence in Part B. Then determine if is convergent, divergent, or definitely divergent. Explain your logic.

A) $f(n) = 16/(-2)^n$

B) $f(n) = 3 + (-1)^n$

6) (20 points) Answer EITHER Part A OR Part B.

A) Draw a Venn Diagram with a universal set of $U = \text{Athletes at Bethany College}$. Draw areas $G = \text{members of the Golf team at some time during their time at Bethany College}$, and area $B = \text{members of the baseball team at some time while at Bethany College}$. Put a hash marking on the area $\overline{G \cap B}$. Note: the G has a bar over it. State how you found that area and what that area means. What percentage of athletes is that set? How did you get that estimate?

B) Suppose $A = \{1, 2, 3, 4, 5\}$, $B = \{b \in \mathbb{Z}_+ : b < 8\}$, $C = \{2, 4, 6, 8, 10\}$ and the universal set is given by $U = \{u \in \mathbb{Z}_+ : u < 15\}$. Find $A \cap B$, $B \cup C$, and $A \cap B \cap C$. State how you found each one.

7) (20 points) Answer EITHER Part A OR Part B.

A) Suppose somebody had the illogical utility function of $U(X, Y) = Y + X^2$. Plot the indifference curve four $U(X, Y) = 9$. Plot at least 4 points, showing how you got them. Is this utility function strictly quasi-concave, quasi-concave, quasi-convex, strictly quasi-convex or something else? Explain your logic.

B) Plot $Y = 16 * (.5^X)$. Find at least 5 points, showing how you got them. Is this function strictly convex, convex, concave, strictly concave, or none of the above? Explain your logic.