

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 for $U(X, Y) = 9$. 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 $Y = 16 \cdot (.5^X)$. 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.