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 each) For TWO of the following variables state the dimension (units) of the variable and give one sentence of explanation.
A) Marginal product of labor.
B) Total revenue.
C) Inflation.

2) (8 points) Answer EITHER Part A OR Part B.
A) For the figure to the right, is the relationship one-to-one, onto, and/or a function? Explain your logic.
B) Is the relationship invertable? If no, tell me why not. If yes, tell me how you reached that conclusion.
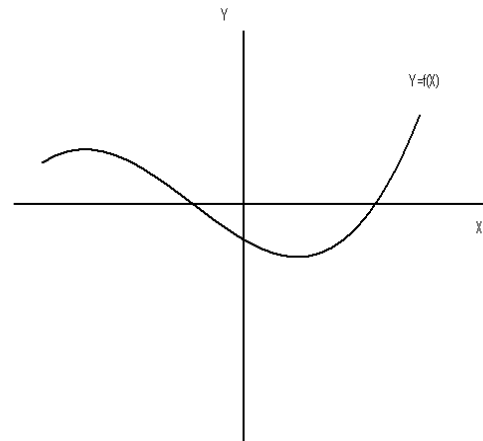
4) (8 points) Find the following limit showing all work.

$$\lim_{n \to \infty} \left(\frac{5 + \dfrac{7}{n}}{10 + \dfrac{12}{n^2}} \right)$$

5) (10 points) Answer EITHER Part A OR Part B.
A) Plot the following interval on a number line $(-\infty, 7]$.
B) Find the distance between the points $(-3, 5, 2)$ and $(1, 9, -2)$. Show all work.

6) (14 points) $Y = X^3 - 3X^2 - 9X + 4$. Find the first two derivatives. Where are the local maxima or minima? Show all work. Given your second derivative, tell me if the point(s) is(are) maxima or minima.

7) (14 points) Answer EITHER Part A OR Part B.

A) $TPL = 10L^{1/2} - L$. Find the first two derivatives. Where are the local maxima or minima? Show all work. Given your second derivative, tell me if the point(s) is(are) maxima or minima.
B) $\Pi = P(Q)*Q - C(Q)$ where $P(Q) = 1000*Q^{-1/2}$ and $C(Q) = 10 + 5Q$. Find the first two derivatives. Where are the local maxima or minima? Show all work. Given your second derivative, tell me if the point(s) is(are) maxima or minima.

8) This question refers to the series formed by $s_n = \sum_{t=1}^{n} \dfrac{FV}{(1+r)^t}$.

A) (10 points) What is the $\lim_{n \to \infty} \left| \dfrac{a_{n+1}}{a_n} \right|$

B) (6 points) Is the series convergent or divergent? Explain your logic. **If convergent**, what does it converge to? Show all work. **If divergent**, what does that say about stock values?

9) (18 points) Draw a Venn diagram Bethany College students as the universal set. Have as subsets the following: students majoring in Accounting (A), students involved in sports (S), and students involved in a fraternity or sorority (F). Given your diagram, what percentage of Bethany students are in each of the following sets: A∪F, S∩F, and S̄? Briefly explain your logic.