

Place your name on the back of this sheet of paper and nowhere else. Staple your answers face up on the front of this sheet of paper. Failure to follow these directions will cost you 10 points. If you use double-sided printing or print on the back of scrap paper, I will give you one additional point.

Show all work on all questions.

1) (5 points each) Find the limits to each of the following sequences:

$$A) a_n = \frac{4n^3 + 5n^2 + 8n + 5}{2n^3 + 5n + 6}$$

$$B) a_n = \frac{5n^3 + 4n - 3}{10n^2 + 5n + 5}$$

$$C) a_n = \frac{4 + 7n + 8n}{8 - 9n - 10n^3}$$

2) (5 points each) For each of the following sequences, determine if the associated series converges or diverges.

$$A) a_n = (3/4)^n$$

$$B) a_n = 2^n$$

3) (20 points) In *Principles of Macroeconomics*, we calculated the government spending multiplier. We started with the equation $C = 100 + MPC \cdot (Y - T)$. We assumed that T was zero. We then had a sequence of expenditures, $\Delta G, \Delta C, \Delta C \dots$ where $\Delta C = \Delta Y \cdot MPC$ where ΔY equaled the previous entry in the sequence. Write this sequence in the form of a geometric sequence, i.e., $a_n = \dots$. Then write the formula for the geometric series s_n . Given the properties of geometric series, what is the value for final $\Delta Y = \lim_{n \rightarrow \infty} (s_n)$? Since the multiplier is $\Delta Y / \Delta G$, what is the formula for the multiplier? If the $MPC = .9$, then how much is that?

4) (20 points) Suppose you were to buy a bond with a face value of \$5000, a coupon rate of 4%, with interest paid semi-annually, and a maturity of $2\frac{1}{2}$ after you bought it. Set up the equation which will determine the internal rate of return if you paid \$5010 for it. State how you determined which number goes where. Do not solve it. Is that return greater, less than, or equal to 4%? Explain your logic.

5) (20 points) Suppose you were to buy a bond with a face value of \$10,000, a coupon rate of 6%, with interest paid quarterly, and a maturity of $6\frac{1}{2}$ after you bought it. Set up the equation which will determine how much you should pay if you want an internal rate of return of 7%. State how you determined which number goes where. Do not solve it. Is that number going to be greater, less than, or equal to \$10,000? Explain your logic.

6) (15 points) Suppose you were to buy a bond with a face value of \$9000, a coupon rate of 12%, with interest paid monthly forever. Set up the equation which will determine the internal rate of return if you paid \$9000 for it. State how you determined which number goes where. Do not solve it. Is that number greater, less than, or equal to 12%? Explain your logic.