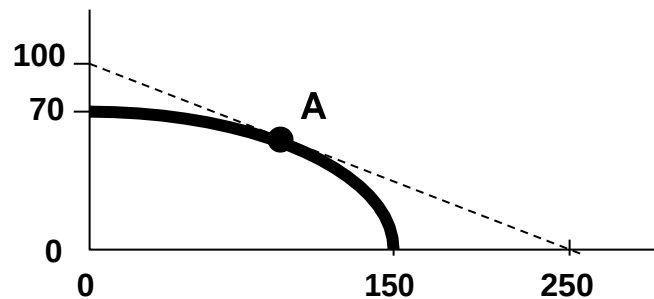




## MBA Summer Math Review Problems

The following 10 problems deal with mathematical concepts that will be used in a variety of applications during your MBA program, e.g., analyzing the risk-return tradeoff in financial portfolios, valuing financial options, inventory analysis, evaluating cash flow streams, market demand estimation, and supply and demand analysis. It is important to have a command of these concepts. If you have difficulties with even one of the problems, you are strongly encouraged to review basic business mathematics this summer, perhaps relying on the resources mentioned in the cover letter.

1. What is the slope of the curve at point A?



2. Consider the equation:  $R = \frac{W}{1 - T \frac{D}{V}}$

Suppose W, T, and D are all positive. As V increases, does R increase or decrease?

- 3.
- (a) A \$1000 investment returns 10 percent compounded annually. How much will the investment be worth in 3 years?
  - (b) What annual interest rate, compounded quarterly, would be required for a \$1000 investment to be worth \$1200 in 3 years?

4. Consider the following demand and supply functions:

$$\begin{array}{ll} P = 27 - 3Q & \text{(demand equation)} \\ \text{and } P = 2Q + 2 & \text{(supply equation)} \end{array}$$

- (a) The values for price and quantity that simultaneously solve the supply and demand functions are called equilibrium values. Find the equilibrium values for P and Q above.
- (b) Graph the demand and supply functions with price on the vertical axis. What is the slope of the demand curve? Of the supply curve? For the two slope values, be sure to specify the units.

5. Determine the values of  $x$  that solve the following:  $2x^2 + x - 10 = 0$

6. Determine  $\sum_{t=1}^5 \frac{t^2}{(1 + \frac{1}{10})^t}$

7. Define  $Y_1 = \max[5, X - 20]$ . Graph  $y$  as a function of  $x$ .

8. (a) With a standard deck of 52 playing cards, what is the probability of drawing a red Jack?
- (b) Conditional on having drawn a face card (i.e., Jack, Queen or King), what is the probability of drawing a red Jack?
- (c) What is the probability of getting any pair (two "sixes", two "jacks", etc.) if the first card is drawn at random from one deck and the second card is selected from a second complete deck? What is the probability of getting a pair if the two cards are dealt together from one deck?
9. Consider the following two sets of numbers: Set #1: 2, 4, 7, 8, 10  
Set #2: 0, 3, 7, 9, 12  
The numbers in the first set all occur with equal probability and the numbers in the second set occur with probabilities 0.3, 0.1, 0.2, 0.1, 0.3 respectively.
- (a) Calculate the mean and standard deviation for Set #1.
- (b) Calculate the mean and standard deviation for Set #2. Compare the means and standard deviations of these two set of numbers. What do they tell you about the two set of numbers?
10. Consider a firm that produces widgets at a cost of  $C$  per unit, and in addition, has a fixed overhead cost of  $F$ . The firm can sell each widget it makes at a price of  $P$  per unit.
- (a) Write the mathematical expression for the break-even quantity, i.e. the level of production where the firm's profit is zero.
- (b) If the firm has a demand curve given by  $P = 60 - 2Q$ , has fixed costs of \$10, and produces output at a cost of \$8 per unit, use calculus to identify the price that maximizes the firm's profit.