

ECO 134: Applied Mathematics - I
Sample Mid-Term 1 Examination
Chapters 2 and 3

**Please note that the sample exam does not cover all the materials you are responsible to know for the exam. You are encouraged to additionally go through the book, class notes and worksheets to prepare for this exam more thoroughly.*

1. Given $A = \{4, 5, 6\}$, $B = \{3, 4, 6, 7\}$ and $C = \{2, 3, 6\}$, verify the distributive law.

2. How many subsets of set $S = \{a, b, c, d\}$ can be formed? Give examples of 5 subsets that can be formed from set S .

3. Find the domain of the following functions:

(a) $y = \frac{1}{x+1}$

(b) $y = \sqrt{x-1}$

4. Find the domain and range of the following functions:

(a) $y = -x^2 + 4$

(b) $y = x^2$

5. If the domain of the function $y = 5 + 3x$ is the set $\{x \mid 1 \leq x \leq 9\}$, find the range of the function and express it as a set.

6. In the theory of firm, economists consider the total cost C to be a function of the output level Q : $C = f(Q)$.

(a) According to the definition of a function, should each cost figure be associated with a unique level of output?

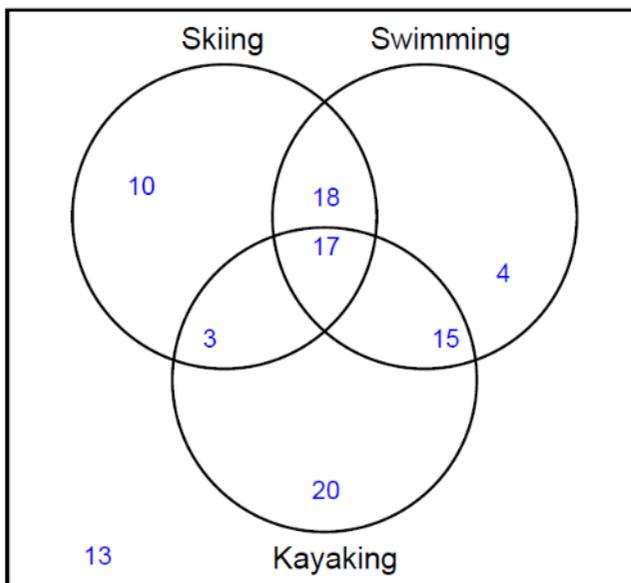
(b) Should each level of output determine a unique cost figure?

7. Graph the function $y = x^2 + 5x - 2$ for the set of values $-5 \leq x \leq 5$.

8. 150 college freshmen were interviewed. 85 were registered for a Math class. 70 were registered for an English class and 50 were registered for both Math and English.

- (a) How many signed up only for a Math class?
- (b) How many signed up only for an English class?
- (c) How many signed up for Math or English?
- (d) How many signed up neither for Math nor English?

9. Consider a universal set of students from Outdoors School. The subsets of students who like Swimming, Skiing and Kayaking are shown in the Venn diagram below:



The numbers in the universal set refer to the number of elements.

- (a) How many students like Skiing or Swimming or Kayaking? _____
- (b) How many students like both Skiing and Swimming but not Kayaking?

- (c) How many students like Skiing or Kayaking but not Swimming?

- (d) How many students do not like either Skiing or Kayaking? _____
- (e) How many students like both Skiing and Kayaking but not Swimming? _____
- (f) How many students only like Skiing? _____
- (g) How many students do not like either Skiing or Swimming? _____

10. At a breakfast buffet, 93 people chose coffee and 47 people chose juice. 25 people chose both coffee and juice. If each person chose at least one of these beverages, how many people visited the buffet?

11. Simplify the following expressions:

(a) $4x^{-2} \cdot 2x^3$

(b) $4(3m^3)^2$

(c) $\frac{(2x^3)(8x^5)}{4x^6}$

(d) $\frac{9x^4 - 27x^6}{3x^3}$

(e) $\left(\frac{-7a^2b^3c^0}{3a^3b^4c^3}\right)^{-4}$

(f) $5x^2y(2x^4y^{-3})$

12. Consider the following market data for Product A

$$Q_d = 3 - P^2, \quad Q_s = 6P - 4, \quad Q_s = Q_d$$

- (a) Draw the demand and supply curves on the same axis.
- (b) Find the equilibrium price and quantity.

13. The demand and supply functions of a two-commodity model are as follows:

$$Q_{d1} = 34 - 4P_1 + P_2 \text{ and } Q_{s1} = -6 + 6P_1$$

$$Q_{d2} = 22 + P_1 - 2P_2 \text{ and } Q_{s2} = -6 + 6P_2$$

Find the equilibrium of the model.

14. Each student in a class of 40 plays at least one indoor game chess, carom and scrabble. 18 play chess, 20 play scrabble and 27 play carom. 3 students play chess and scrabble, but not carom. While 8 students play carom and scrabble, but not chess. 5 students play scrabble only.

(a) How many students play all three games?

(b) How many students play chess and carom, but not scrabble?

(c) How many students play chess only?

Hint: Let the number of student who play chess and carom, but not scrabble be denoted by x