

(10pts) NAME (printed neatly): _____

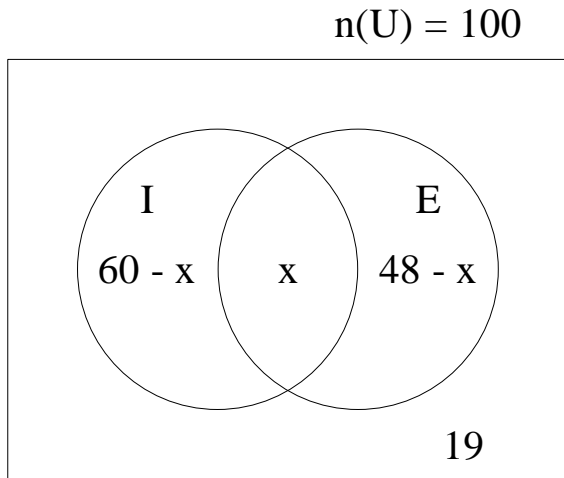
(5pts) Section Number (circle correct section): 503 (10:20am) 521 (11:30am) 523 (1:50pm)

Quiz Grade: _____

1. (15pts) A simple economy consists of two industries: cloth (C) and food (F). The production of 1 unit of cloth requires the consumption of 0.2 units of cloth and 0.3 units of food. The production of 1 unit of food requires the consumption of 0.4 units of cloth and 0.5 units of food. The outside demand is for 100 units of cloth and 200 units of food. Give the input-output matrix for this economy, and label its rows and columns.

$$\begin{array}{c} \text{C} \quad \text{F} \\ \text{C} \begin{bmatrix} 0.2 & 0.4 \\ 0.3 & 0.5 \end{bmatrix} \\ \text{F} \end{array}$$

2. (10pts) Of 100 cell phone owners, 60 own an iPod (I), 48 own an ear bud (E), and 19 own neither an iPod nor an ear bud. Of these cell phone owners, how many own both an ear bud and an iPod?



$$(60 - x) + x + (48 - x) + 19 = 100$$

$$x = 27$$

Of these 100 cell phone owners, 27 own both an ear bud and iPod.

3. (20pts) In a linear programming problem, x is the number of elephants and y is the number of penguins. The corner points of the bounded feasible region are $(10, 10)$, $(20, 40)$, and $(30, 20)$. Maximize the revenue $R = 10x + 5y$, where the revenue is in Euros. Give the feasible solution(s) as indicated by the context of this problem.

Corner	$R = 10x + 5y$
$(10, 10)$	150
$(20, 40)$	400 max
$(30, 20)$	400 max

Method 1 $(20, 40)$ $(30, 20)$

LinReg L1, L2, Y1

 $Y1 = -2x + 80$ $Y1(21) = 38$ $Y1(22) = 36$ $Y1(23) = 34$

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 $Y1(29) = 22$ Method 2 $R = 10x + 5y$ $400 = 10(21) + 5y$ $y = 38$ $400 = 10(22) + 5y$ $y = 36$ $400 = 10(23) + 5y$ $y = 34$

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 $400 = 10(29) + 5y$ $y = 22$

The maximum revenue of 400 Euros is obtained when

20 elephants and 40 penguins,

21 elephants and 38 penguins,

22 elephants and 36 penguins,

23 elephants and 34 penguins,

24 elephants and 32 penguins,

25 elephants and 30 penguins,

26 elephants and 28 penguins,

27 elephants and 26 penguins,

28 elephants and 24 penguins,

29 elephants and 22 penguins, or

30 elephants and 20 penguins are sold.

4. Let $A = \{1, 2, g, h\}$, $B = \{1, 3, h, t\}$, $D = \{5, g\}$, and the universal set $U = A \cup B \cup D$.

a. (5pts) $n(A \cap B) = n(\{1, h\}) = 2$

b. (10pts) $A \cup D = \{1, 2, g, h, 5\}$

c. (5pts) $n[(B \cup D)^C] = n[\{1, 3, h, t, 5, g\}^C] = n(\{2\}) = 1$

d. (5pts) **TRUE** or False $1 \in (A^C \cap D)^C$

$$(A^C \cap D)^C = A \cup D^C = \{1, 2, g, h, 3, t\}$$

e. (10pts) List all subsets of set D . Circle all subsets that are not proper subsets of D .

\emptyset , $\{5\}$, $\{g\}$ and $D = \{5, g\}$

$D = \{5, g\}$ is the subset of D that is not a proper subset of D

f. (5pts) How many subsets does the universal set U have?

$$U = \{1, 2, g, h, 3, t, 5\}$$

$$2^{n(U)} = 2^7 = 128$$

The universal set U has 128 subsets.

g. (10point BONUS) $A \cap B \cap D = \emptyset$ OR $\{ \}$