This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 05

07MAY2024

Do NOT write in this box. Your MARK will be placed here.

Subject :	Maths
Class :	11SE
Teacher :	Mr. George El Haber
Duration :	1 hour

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

I. Consider the function $f(x) = \frac{x^2+x-2}{x-2}$, and denote by (C) its representative curve in an orthonormal system $(O, \vec{\imath}, \vec{\jmath})$. **[25 pts.]**

1) Find the domain of definition of $f(x)$.
2) Find the limits at the boundaries of the domain of definition and deduce the asymptotes.
3) Show that the line (D) with equation $y = x + 3$ is an asymptote to (C).
4) Study the relative position of (C) with respect to (D).
5) Calculate $f'(x)$.
6) Set-up the table of variations.
7) Find the particular points.
8) Draw the graph.
9) Show that $I(2; 4)$ is a center of symmetry for (C).

II. A student activity camp has climbing and sailing classes. **[12 pts.]**

50 students attend the activity camp.

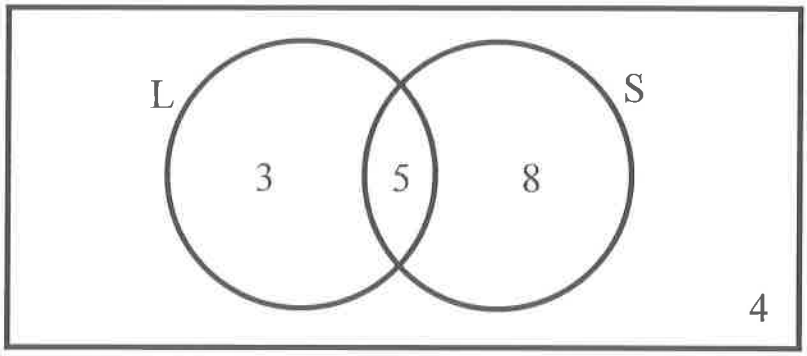
35 students do climbing.

10 students do both classes.

2 students do neither class.

a) Represent this information on a Venn Diagram.
b) A student attending the activity camp is selected at random.
   Find the probability that this student:
   i. Did exactly one class.
   ii. Did sailing, and not climbing.

III. The Venn diagram gives information about the number of students in 11SE who are studying Latin (L) or Spanish (S) or both or neither. **[9 pts.]**



Use the Venn diagram to complete the following:

A student is chosen at random. Determine the probability:

a) Studies only Latin.

b) Studies neither.

c) Doesn't study Latin.

IV. C and D are two mutually exclusive events:

P(D) = 0.4 and P(C or D) = 0.78

Work out P(not C). **[4 pts.]**

V. The blood groups of m people are distributed as follows: 5 have type A blood, 6 have B blood type, 4 have O blood type and 15 have type AB blood. If a person from this group is selected at random: **[10 pts.]**

a) What is the probability that this person has O blood type.

b) What is the probability that this person doesn't have blood type AB.

----------George El Haber----------

Maths 11SE SEOS Answer key

I. $f(x)=\dfrac{x^2+x-2}{x-2}$ $\quad x\neq 2$

1) Domain of definition: $]-\infty;2[\cup]2;+\infty[$ (2)

2) $\lim\limits_{x\to-\infty}\dfrac{x^2+x-2}{x-2}=\lim\limits_{x\to-\infty}\dfrac{x^2}{x}=\lim\limits_{x\to-\infty}x=-\infty$ (1)

$\lim\limits_{x\to+\infty}\dfrac{x^2+x-2}{x-2}=\lim\limits_{x\to-\infty}\dfrac{x^2}{x}=\lim\limits_{x\to-\infty}x=+\infty$ (1)

$\lim\limits_{x\to 2^-}\dfrac{x^2+x-2}{x-2}=-\infty$ (1)

$\lim\limits_{x\to 2^+}\dfrac{x^2+x-2}{x-2}=+\infty$ (1)

(1) $x=2$ V.A.

3) $\lim\limits_{x\to\pm\infty}[f(x)-y]=\lim\limits_{x\to\pm\infty}\left[\left(\dfrac{x^2+x-2}{x-2}\right)-(x+3)\right]$

$=\lim\limits_{x\to\pm\infty}\dfrac{4}{x-2}=\dfrac{4}{\infty-2}=0^+$ (2)

4) $\lim\limits_{x\to-\infty}[f(x)-y]=0^-$ The curve is below the O.A. (1)

$\lim\limits_{x\to+\infty}[f(x)-y]=0^+$ The curve is above the O.A. (1)

5) $f'(x)=\dfrac{(2x+1)(x-2)-(x^2+x-2)}{(x-2)^2}=\dfrac{2x^2-4x+x-2-x^2-x+2}{(x-2)^2}$

$f'(x)=\dfrac{x^2-4x}{(x-2)^2}$ (3) $\quad f'(x)=0$ $\quad x^2-4x=0$

$x(x-4)=0$

$\boxed{x=0}$ (1) $\quad x-4=0$

$\boxed{x=4}$ (1)

6) Table of variations:

x	$-\infty$		0		2		4	$+\infty$
$f'(x)$		$+$	0	$-$	‖	$-$	0	$+$
$f(x)$	$-\infty$	↗	$(0;1)$	↘	$-\infty$ ‖ $+\infty$	↘	$(4;9)$	↗ $+\infty$

(2)

7) Particular Points:

x-intercept: $(1;0)$ $(-2;0)$ (½)

y-intercept: $(0;1)$ (½)

Extrema: Local Max: $(0;1)$ Local Min: $(4;9)$ (½)

Table of values: (½)

x	-1	0	1
y	2	3	4

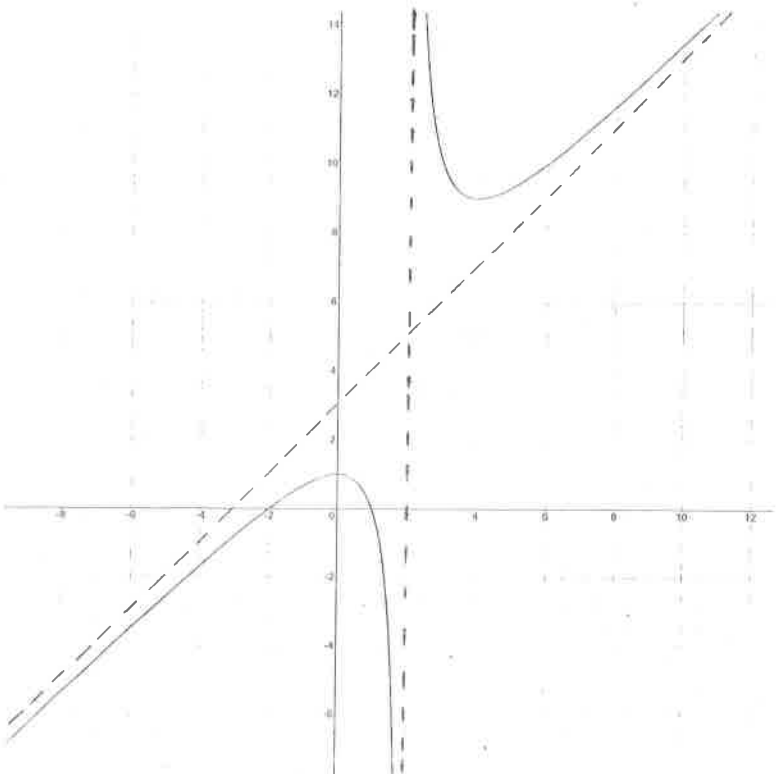
(¼)

Extra points:

x	-1	1	3	5
y	0.6	0	10	9.3

(¼)

8) (3)



9) $f(2a-x)+f(x)$

$= f(4-x)+f(x)$

$= \frac{(4-x)^2+(4-x)-2}{(4-x)-1} + \frac{x^2+x-2}{x-1}$

$= \frac{(4-x)^2+4-x-2}{4-x-1} + \frac{x^2+2x-x-2}{x-1}$

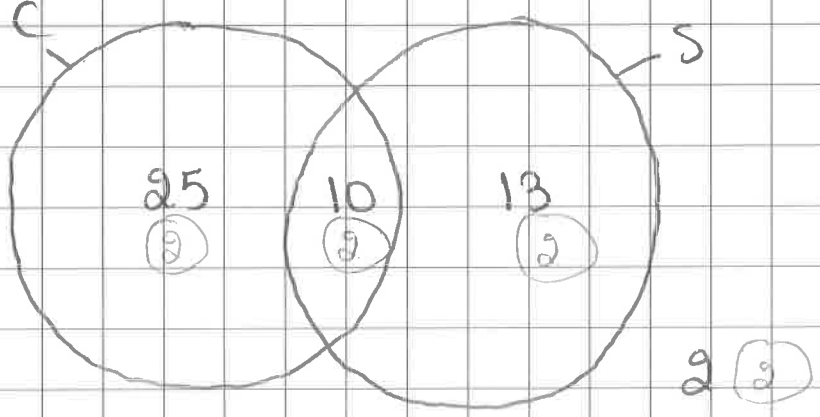
$= \frac{16-8x+x^2+2-x}{3-x} + \frac{x(x+2)-(x+2)}{x-1}$

$= \frac{18-9x+x^2}{-(x-3)} + \frac{(x+2)(x-1)}{x-1}$

$= -x+6+x+2$

$= 8 = 2b$ Verified. (2)

II. a)



(2)

- $35-10=25$ Climbing class only
- $50-25-10-2=13$ Sailing class

b) i) $\frac{25}{50}+\frac{13}{50}=\frac{38}{50}=\frac{19}{25}$ (2)

ii) $\frac{13}{50}$ (2) $\Rightarrow P(S \cap \bar{C}) = P(S) - P(S \cap C)$

$= \frac{23}{50} - \frac{10}{50} = \frac{13}{50}$

III. a) $\frac{3}{20}$ (3)

b) $\frac{4}{20} = \frac{1}{5}$ (3)

c) $\frac{12}{20} = \frac{3}{5}$ (3)

IV. $P(C \cup D) = P(C) + P(D) - P(C \cap D)$ Mutually exclusive $P(C \cap D) =$

$0.78 = P(C) + 0.4$

$P(C) = 0.78 - 0.4 = 0.38$ (2)

$P(\text{not } C) = 1 - 0.38 = 0.62$ (2)

V. m people 5A 6B 40 15AB

a) $P(O) = \frac{4}{30} = \frac{2}{15}$ (3)

b) $P(\bar{A}B) = 1 - P(AB)$

$= 1 - \frac{15}{30}$

$= \frac{1}{2}$ (3)