This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Lebanon Evangelical School
for Boys and Girls Loueizeh - Baabda

Stage Exam 02
19DEC2022

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

Subject :	Maths
Class :	11SE
Teacher :	Farhan B.
Duration :	1 hour
Calculators will be ALLOWED	

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) Find the quotient and the remainder of the division of P(x) by d(x) using the synthetic (Horner's method) division. $P(x) = 3x^5 + 5x^4 - 3x^3 - 5x - 12; d(x) = x + 2$

[4 marks]

II) Find the quotient and the remainder of the division of P(x) by d(x) using the polynomial (long) division. $P(x) = 2x^4 + 5x^3 - 7x^2 + 19; d(x) = x^2 + x - 1$

[4 marks]

III) Solve the following inequalities, write the solution in the interval form.

a) $\frac{x^2 + 3x - 10}{1 - x} \geq 0$

[4 marks]

b) $\frac{x^2 - 6x + 9}{x - 2} \leq 0$

[4 marks]

IV) Find the following limits

a) $\lim_{x \to 3} \left(\frac{1}{9}x^2 + \frac{1}{3}x - 4\right)$ [3 marks]

b) $\lim_{x \to 5} \frac{x^2 - 25}{x - 5}$ [3 marks]

c) $\lim_{x \to 5^-} \frac{x + 10}{x - 5}$ [3 marks]

d) $\lim_{x \to -2^+} \frac{x + 1}{x + 2}$ [3 marks]

e) $\lim_{x \to +\infty} \frac{6x^3 - 7x - 23}{3x^3 - 22x^2 + 41}$ [3 marks]

f) $\lim_{x \to -\infty} \frac{x^3 - x^2 - 2}{x^4 - 12x^2 + 4}$ [3 marks]

g) $\lim_{x \to 0} \frac{(x+1)^2 - 1}{x}$ [3 marks]

h) $\lim_{x \to 2} \frac{\frac{1}{x} - \frac{1}{2}}{x - 2}$ [3 marks]

I/

-2	3	5	-3	0	-5	-12
		-6	2	2	-4	18
	3	-1	-1	2	-9	6

(1) (1) (1)

Quotient $3x^4 - x^3 - x^2 + 2x - 9$; Remainder 6 (1)

II/

$$\begin{array}{r|l} & 2x^2+3x-8 \\ \hline x^2+x-1 & 2x^4+5x^3-7x^2+0x+19 \\ & \ominus 2x^4 \ominus 2x^3 \oplus 2x^2 \\ & \hline & 0 \quad 3x^3-5x^2+0x \\ & \ominus 3x^3 \ominus 3x^2 \oplus 3x \\ & \hline & 0 \quad -8x^2+3x+19 \\ & \oplus -8x^2 \oplus 8x \ominus 8 \\ & \hline & 11x+11 \end{array}$$

(1) (1) (1) (1)

Quotient: $2x^2+3x-8$ Remainder $11x+11$

III/ a) $\dfrac{x^2+3x-10}{1-x} = \dfrac{(x+5)(x-2)}{(1-x)} \geq 0$ (1)

x	-5		2	
$x+5$	$-\ 0\ +$	$+$	$+$	$+$
$x-2$	$-$	$-$	$-\ 0\ +$	
$1-x$	$+$	$+\ 0\ -$		$-$
	$+\ 0\ -$	$\|\|$	$+\ 0\ -$	

(2)

Solution $]-\infty, -5] \cup]1, 2]$ (1)

b) $\frac{x^2-6x+9}{x-2} \leq 0 \quad \frac{(x-3)^2}{x-2} \leq 0$ (1)

x		2		3	
$(x-3)^2$	+	+	0	+	
$x-2$	−	0	+		+
	−	‖	+	0	+

(2)

Solution $]-\infty, 2]$ (1)

IV

a) $\lim_{x\to 3}\left(\frac{1}{9}x^2+\frac{1}{3}x-4\right) = \frac{1}{9}(3)^2+\frac{1}{3}(3)-4 = 1+1-4 = -2$ (3)

b) $\lim_{x\to 5}\frac{x^2-25}{x-5} = \lim_{x\to 5}\frac{(x-5)(x+5)}{(x-5)} = \lim_{x\to 5}(x+5) = 5+5 = 10$ (3)

c) $\lim_{x\to 5^-}\frac{x+10}{x-5} = \frac{5+10}{5^- - 5} = \frac{15}{0^-} = -\infty$ (3)

d) $\lim_{x\to -2^+}\frac{x+1}{x+2} = \frac{-2^+ +1}{-2^+ +2} = \frac{-1}{0^+} = -\infty$ (3)

e) $\lim_{x\to+\infty}\frac{6x^3-7x+23}{3x^3-22x^2+41} = \lim_{x\to+\infty}\frac{6x^3}{3x^3} = \frac{6}{3} = 2$ (3)

f) $\lim_{x\to-\infty}\frac{x^3-x^2-2}{x^4-12x^2+4} = \lim_{x\to-\infty}\frac{x^3}{x^4} = \lim_{x\to-\infty}\frac{1}{x} = \frac{1}{-\infty} = 0$ (3)

g) $\lim_{x\to 0}\frac{(x+1)^2-1}{x} = \lim_{x\to 0}\frac{x^2+2x+1-1}{x} = \lim_{x\to 0}\frac{x(x+2)}{x} = \lim_{x\to 0} x+2$ (3)

$= 0+2 = 2$

h) $\lim_{x \to 2} \dfrac{\frac{1}{x} - \frac{1}{2}}{x-2} = \lim_{x \to 2} \dfrac{\frac{2-x}{2x}}{x-2} = \lim_{x \to 2} \dfrac{2-x}{2x} \times \dfrac{1}{x-2}$

$= \lim_{x \to 2} \dfrac{-1}{2x} = \dfrac{-1}{2(2)} = \dfrac{-1}{4}$ (3)