This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 03
FEB2023

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

Subject :	Maths	
Class :	10B and 10C	
Teacher :	Taline Hawatian	
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.- (8 points)

Choose the correct answer. Justify.

1) The arc $-\frac{35\pi}{8}$ is in:
   a) Quadrant II b) Quadrant III c) Quadrant IV
2) The degree of P(x) is 5 and the degree of Q(x) is 3, then the degree of P(x) + Q(x) is:
   a) 3 b) 5 c) 8
3) The remainder of the division of $P(x) = x^3 - 5x^2 + 17x - 13$ by $(x + 2)$ is:
   a) -75 b) -13 c) 24
4) The degree of P(x) is 3 and the degree of Q(x) is 4 then the degree of P(x).Q(x) is:
   a) 4 b) 7 c) 12
5) If the length of an arc $\propto = \frac{3\pi}{5} rad$ is 9cm, then the radius of the circle is:
   a) 15 b) $\frac{15}{\pi}$ c) $\frac{27\pi}{5}$
6) Consider a circle of radius 6cm and the arc $\propto$ of length 8cm. The measure of the arc $\propto$ in degrees, rounded to the nearest degree, is:
   a) 76° b) 77° c) 78°

II.- (8 points)

Let $P(x) = (m-2)x^3 + 2(m-1)x^2 + (8-3m)x - m - 7$

1) Calculate m so that -1 is a root of $P(x)$.
2) Given the polynomial $P(x) = 3x^3 + 8x^2 - 7x - 12$
   a) Show that -1 is a root of $P(x)$.
   b) $P(x) = (x+1)Q(x)$. Use Horner's method to determine Q(x).
   c) Write $P(x)$ as the product of three factors. Use long division.
   d) Solve the inequality $\frac{(3x-4)(x+1)(x+3)}{(2x-4)(x+7)} \geq 0$

III.- (4 points)

Given the measure $\propto$ of an arc, plot its endpoints on the trigonometric circle.

a) $\propto = -620°$ b) $\propto = \frac{33\pi}{5}$ rad.

IV.- (5 points)

x is an arc between π and 2π such that $tanx = -\frac{3}{4}$.

Calculate $E = 2cotx + 3sinx - 4cosx$

SE03/20222023/Maths/10BC

I- 1) c

$\frac{-35\pi}{8} = \frac{-32\pi - 3\pi}{8} = -4\pi - \frac{3\pi}{8}$ — 1.5

The principal measure is $-\frac{3\pi}{8}$. $-\frac{\pi}{2} < -\frac{3\pi}{8} < 0$

Quadrant IV.

2) degree $P(x) >$ degree $Q(x)$.

degree $(P(x) + Q(x)) =$ deg. $P(x) = 5$ — 1

b

3) a — 1.5

$P(-2) = -8 - 20 - 34 - 13 = -75$

remainder $= P(-2)$.

4) b — 1

degree $(P(x) \cdot Q(x)) =$ deg $P(x)$ + deg. $Q(x) = 3 + 4 = 7$

5) b

$r = \frac{\ell}{\alpha} = \frac{9}{\frac{3\pi}{5}} = \frac{15}{\pi}$ — 1.5

6) a

$8 = \frac{6\pi\alpha^\circ}{180^\circ}$ $\quad \alpha = \frac{180 \times 8}{6\pi} = \frac{240}{\pi} \simeq 76.4^\circ$. — 1.5

II- $P(x) = (m-2)x^3 + 2(m-1)x^2 + (8-3m)x - m - 7$

1) -1 is a root of $P(x)$. $P(-1) = 0$

$P(-1) = (m-2)(-1) + 2(m-1)(1) + (8-3m)(-1) - m - 7$

$= -m + 2 + 2m - 2 - 8 + 3m - m - 7$

$= 3m - 15$

$3m - 15 = 0$ $\quad m = \frac{15}{3} = 5$ — 1

2) $P(x) = 3x^3 + 8x^2 - 7x - 12$

a) $P(-1) = 3(-1) + 8 - 7(-1) - 12 = -3 + 8 + 7 - 12 = 0$

-1 is a root of $P(x)$. — 1

b) $P(x) = (x+1).Q(x)$

x	3	8	-7	-12
	0	-3	-5	+12
	3	5	-12	

1.5

$P(x) = (x+1)(3x^2+5x-12)$ 0.5

c)
$$\begin{array}{r|l} & 3x-4 \\ \hline x+3 & 3x^2+5x-12 \\ \ominus & \ominus 3x^2 \oplus 9x \\ \hline & -4x-12 \\ & \oplus 4x \oplus 12 \\ \hline & 0 \end{array}$$

1.5

$P(x) = (x+1)(x+3)(3x-4)$ 0.5

d) $\dfrac{(3x-4)(x+1)(x+3)}{(2x-4)(x+7)} \geqslant 0$

$x = \frac{4}{3}$ $x = -1$ $x = -3$ 0.5

$x \neq 2$ $x \neq -7$

x	$-\infty$		-7		-3		-1	0	$4/3$		2		$+\infty$
		$-$	‖	$+$	0	$-$	0	$+$	0	$-$	‖	$+$	

1 0.5

$S =]-7;-3] \cup [-1;\frac{4}{3}] \cup]2;+\infty[$

III, a) $\alpha = -620°$
$= -720° + 100°$
$= -2 \times 360° + 100°$
Principal measure $= 100°$ 1.5

b) $\alpha = \frac{33\pi}{5}$
$= \frac{30\pi}{5} + \frac{3\pi}{5}$
$= 6\pi + \frac{3\pi}{5}$ 1.5
Principal measure $= \frac{3\pi}{5}$ rad
$= 108°$.

drawing: 1

IV,- $\tan x = -\frac{3}{4}$ x in $]\pi, 2\pi[$

x is in III or IV quadrant.

$\tan x < 0$ 0.5

x is in quadrant IV.

$\cot x = \frac{1}{\tan x} = -\frac{4}{3}$ 1

$\cos^2 x = \frac{1}{1+\tan^2 x} = \frac{1}{1+\frac{9}{16}} = \frac{16}{25}$ 1

$\cos x = \frac{4}{5}$ accepted 0.5 $\cos x = -\frac{4}{5}$ rejected

$\tan x = \frac{\sin x}{\cos x}$ $\sin x = \tan x \cdot \cos x$

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

$E = 2\cot x + 3\sin x - 4\cos x$

$= 2(-\frac{4}{3}) + 3(-\frac{3}{5}) - 4(\frac{4}{5})$

$= -\frac{8}{3} - \frac{9}{5} - \frac{16}{5} = -\frac{23}{3}$. 1