King Fahd University of Petroleum and Minerals
Dammam Community College

Code B

Term 171

Prep Mathematics – Math 011

Class Test 2

November 20th, 2017

Marking Scheme

Time allowed : 60 Minutes

Name: _____ ID # _____ Section: _____

Read the following instructions:-

This test consists of eight questions.

You must show all necessary steps of your solution to earn the full mark.

Calculators are not allowed.

This test is worth's 8% of the total marks allocated to this course.

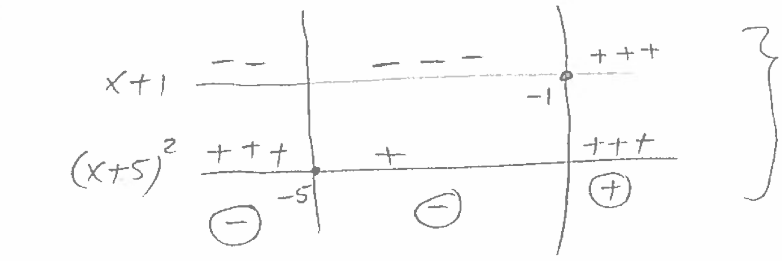
Question	Marks
1	/4
2	/4
3	/4
4	/4
5	/4
6	/4
7	/4
8	/4
Total marks	/32

Question 1. Find the solution set of the inequality $(x^2+10x+25)(x+1)\geq 0$, in interval notation.

$(x+1)(x^2+10x+25)\geq 0$

$(x+1)(x+5)^2\geq 0$ ——— (1)

CRITICAL VALUES: $x=-1, x=-5$ ——— (1)



——— (1)

SOLUTION: $[-1,\infty)\cup\{-5\}$ ——— (1)

NOTE: other method is a possibility.

Question 2. Find the sum of the values of a for which the equation: $ax^2 + 2(a+4)x + 25 = 0$ has only one solution.

$a = a$, $b = 2(a+4) = 2a+8$, $c = 25$

$D = b^2 - 4ac = 0$

$(2)^2(a+4)^2 - 4a(25) = 0$

$(a+4)^2 - 25a = 0$

$a^2 + 8a + 16 - 25a = 0$ — 1

$a^2 - 17a + 16 = 0$ — 1

$(a-1)(a-16) = 0$ — 1.5

$a_1 = 1$, $a_2 = 16$

Sum: $a_1 + a_2 = 1 + 16 = \boxed{17}$ — 0.5

Question 3. If the line $by - 5x = 1$ is perpendicular to the line passing through the points $(4,-1)$ *and* $\left(-\frac{7}{2},2\right)$, then find b.

$$m_1 = \frac{2-(-1)}{-\frac{7}{2}-4} = \frac{3}{-\frac{15}{2}} = \frac{-2}{5} \quad \text{——— (1)}$$

$$m_2 = \frac{-1}{m_1} \Rightarrow m_2 = \frac{5}{2} \quad \text{——— (0.5)}$$

$by - 5x = 1 \Rightarrow by = 5x + 1 \Rightarrow y = \frac{5}{b}x + \frac{1}{b}$, where $m_2 = \frac{5}{b}$ ——— (1)

$$\frac{5}{b} = \frac{5}{2} \quad \text{——— (0.5)}$$

$$\boxed{b = 2} \quad \text{——— (1)}$$

Question 4. Find the solution set of the inequality $\left|\frac{5+2x}{x}\right| < 1$, in interval notation.

$$\left|\frac{2x+5}{x}\right| < 1$$

$$\left|2+\frac{5}{x}\right| < 1$$

$$-1 < 2+\frac{5}{x} < 1 \quad \text{——} (1)$$

$$-3 < \frac{5}{x} < -1 \quad \text{——} (1)$$

$$-\frac{3}{5} < \frac{1}{x} < -\frac{1}{5}$$

$$-\frac{5}{3} > x > -5 \quad \text{——} (1)$$

Solution: $\left(-5, -\frac{5}{3}\right)$ —— (1)

NOTE: Solution can be reached in a different way.

Question 5. Find the equation of a circle in standard form with endpoints of a diameter at $(1,5)$ *and* $(7,8)$.

$C = \left(\frac{1+7}{2}, \frac{5+8}{2}\right) = \left(4, \frac{13}{2}\right)$ ——— (1)

$r = \sqrt{(4-1)^2 + (5-\frac{13}{2})^2}$, $r > 0$ ——— (1)

$= \sqrt{9 + (-\frac{3}{2})^2} = \sqrt{9+\frac{9}{4}} = \sqrt{\frac{45}{4}} = \frac{\sqrt{45}}{2}$ ——— (1)

$(x-4)^2 + (y-\frac{13}{2})^2 = \frac{45}{4}$ or $\left(\frac{\sqrt{45}}{2}\right)^2$ ——— (1)

NOTE: Other ways of solutions are possible.

Question 6. Solve: $4x^3 = -256$.

$\frac{4x^3}{4} = \frac{-256}{4}$ $\quad x^3 = -64$ ——— (0.5)

$x^3 + 64 = 0$

$(x)^3 + (4)^3 = 0$ } ——— (1)

$(x+4)(x^2 - 4x + 16) = 0$

$x + 4 = 0$

$\boxed{x = -4}$

$a = 1,\ b = -4,\ c = 16$

$$x = \frac{-(-4) \pm \sqrt{(4)^2 - 4(1)(16)}}{2(1)} \quad \} \text{ (1)}$$

$$= \frac{4 \pm \sqrt{16 - 64}}{2}$$

$$= \frac{4 \pm \sqrt{-48}}{2}$$

$$= \frac{4 \pm 4\sqrt{3}\,i}{2}$$

$$= 2 \pm 2\sqrt{3}\,i$$

$x = -4$ (0.5), $x = 2 + 2\sqrt{3}\,i$ (0.5), $x = 2 - 2\sqrt{3}\,i$ (0.5)

Question 7. Find the number of different real solutions by solving:

$2n^6 - 7n^4 + 5n^2 = 0$.

$n^2(2n^4 - 7n^2 + 5) = 0$ —— (1)

$n^2(2n^2 - 5)(n^2 - 1) = 0$ —— (1)

$n^2 = 0$, $2n^2 - 5 = 0$, $n^2 - 1 = 0$

$n = 0$ — (0.5), $2n^2 = 5$, $n^2 = 1$

$n^2 = \frac{5}{2}$ — $n = \pm 1$ — (0.5)

$n = \pm\sqrt{\frac{5}{2}} = \pm\frac{\sqrt{5}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

(OR)

$= \pm\frac{\sqrt{10}}{2}$

$n = \pm\frac{\sqrt{10}}{2}$ —— 0.5

The number is [5] different solutions. —— 0.5

Question 8. If the equation: $x^2 = -25 + 6x$ is written in the complete square form $(x-n)^2 = m$, then find $\frac{1}{3}n + \frac{1}{2}m$.

$$x^2 - 6x = -25$$

$$x^2 - 6x + \left(\frac{-6}{2}\right)^2 = -25 + \left(\frac{-6}{2}\right)^2$$

$$x^2 - 6x + 9 = -25 + 9 \quad \text{—— (1)}$$

$$(x-3)^2 = -16 \quad \text{—— (1)}$$

$n = 3$, $m = -16$ —— (1)

$$\frac{1}{3}n + \frac{1}{2}m = \frac{1}{3}(3) + \frac{1}{2}(-16) = 1 - 8 = \boxed{-7} \quad \text{—— (1)}$$