King Fahd University of Petroleum and Minerals

Dammam Community College

Term 161

Code
A

Prep Mathematics – Math 011

Class Test 2

December 6th, 2016

Time allowed: 60 Minutes

Name: Marking Scheme **ID #** _____ **Section:** _____

This test consists of eight questions.

You must show all necessary steps of your solution to get 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.

a) Solve $3(2x-5a)+4b=4x-2$ for x

$3(2x-5a)+4b=4x-2$

$6x-15a+4b=4x-2$ (1/2 pt)

$6x-4x=15a-4b-2$ (1/2 pt)

$x=\left(\frac{15a-4b-2}{2}\right)$ (1 pt)

b) Determine whether the following equation is an identity, a conditional equation, or a contradiction. Give the solution set.

$2(2x-2)=4x+7$

$2(2x-2)=4x+7$

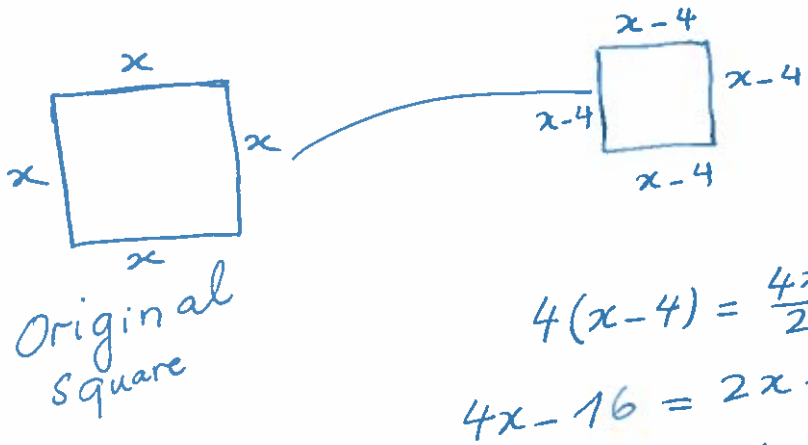
$4x-4=4x+7$ (1pt)

$-4\neq 7$ Contradiction equation

Solution set $=\phi$. (1pt)

Question 2.

If the length of each side of a square is decreased by 4 cm, the perimeter of the new square is 10 cm more than half the perimeter of the original square. What are the dimensions of the original square?



$4(x-4) = \frac{4x}{2} + 10$ 1pt

$4x - 16 = 2x + 10$ — 1pt

$2x = 26$ — 1pt

$x = 13$ — 1pt

Question 3.

Find the sum of the solutions of the equation $x - \sqrt{5x+6} = 6$

$$x - \sqrt{5x+6} = 6$$

$$x - 6 = \sqrt{5x+6}$$

$$(\quad)^2 = (\quad)^2$$

$$(x-6)^2 = (\sqrt{5x+6})^2$$

$$x^2 - 12x + 36 = 5x + 6$$

$$x^2 - 17x + 30 = 0$$

$a = 1,\ b = -17,\ c = 30$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \quad b^2 - 4ac = (-17)^2 - 4(30) = 169$$

$$x = \frac{17 \pm \sqrt{169}}{2}$$

$$x = \frac{17+13}{2} = 15$$

$$x = \frac{17-13}{2} = 2$$

$x = 15$ and $x = 2$ are the proposed solutions

We check

$x = 2$

$2 - \sqrt{16} \neq 6$

$x = 2$ rejected

$x = 15$

$15 - \sqrt{5(15)+6} = 6$

$15 - \sqrt{81} = 6$

$15 - 9 = 6$ ✓

Sum of the Solution $= 15$

Question 4. Solve $(x+1)^{\frac{2}{5}} - 3(x+1)^{\frac{1}{5}} + 2 = 0$,

Let $u = (x+1)^{1/5}$, $u^2 = (x+1)^{2/5}$

Then $u^2 - 3u + 2 = 0$ 1 pt

$(u-1)(u-2) = 0$ $\begin{cases} u = 1 & \text{1/2 pt} \\ \text{or} \\ u = 2 & \text{1/2 pt} \end{cases}$

$u = 1$

$(x+1)^{1/5} = 1$ 1/2 pt

$x + 1 = 1^5$

$x = 0$ 1/2 pt

$u = 2$

$(x+1)^{1/5} = 2$ 1/2 pt

$(x+1) = 2^5 = 32$

$x + 1 = 32$

$x = 31$ 1/2 pt

Solution Set $= \{0, 31\}$

Question 5. Solve the rational inequality, and write the solution set in interval notation.

$$\frac{2}{x+1} \le \frac{1}{x+3}$$

$$\frac{2}{x+1} - \frac{1}{x+3} \le 0 \quad , \quad \text{Lcd}(x+1, x+3) = (x+1)(x+3)$$

1pt

$$\frac{2(x+3) - (x+1)}{(x+1)(x+3)} \le 0$$

1pt

$$\frac{2x+6-x-1}{(x+1)(x+3)} = \frac{x+5}{(x+1)(x+3)} \le 0$$

$$x+5 = 0 \Rightarrow x = -5$$

$$(x+1)(x+3) = 0 \Rightarrow x = -1, \; x = -3$$

1pt

		-5		-3		-1	
$\frac{x+5}{(x+1)(x+3)} \le 0$	$x = -6$		$x = -4$		$x = -2$		$x = 0$
	$\frac{-}{-\cdot -} \le 0$		$\frac{+}{-\cdot -} \ge 0$		$\frac{+}{-\cdot +} \le 0$		$\frac{+}{+\cdot +} \ge 0$
	TRUE ✓		False ✗		TRUE ✓		False ✗

Solution Set $= (-\infty, -5] \cup (-3, -1)$ ✓ 1pt

Question 6.

Solve $|7x-2|-4>1$, write the solution set in interval notation.

$|7x-2|-4>1$

$|7x-2|>5$ ← $\frac{1}{2}$ pt

$\Leftrightarrow$ $\frac{1}{2}$ pt $7x-2>5$ or $7x-2<-5$ $\frac{1}{2}$ pt

$\frac{1}{2}$ pt $7x>7$ $7x<-3$ $\frac{1}{2}$ pt

$\frac{1}{2}$ pt $x>1$ $x<-\frac{3}{7}$ $\frac{1}{2}$ pt

Solution set $=(-\infty,-3/7)\cup(1,\infty)$. $\frac{1}{2}$ pt

Question 7.

Let M be the midpoint between the points $(2x, -7x)$ and $(-2x, -4x)$, find the distance between M and $(2x, -7x)$ where $x < 0$.

$$M = \text{midpoint} = \left(\frac{2x-2x}{2}, \frac{-7x-4x}{2}\right)$$

$$M = \left(0, -\frac{11}{2}x\right)$$

1pt

distance $(M, (2x, -7x))$

$$= \sqrt{(2x)^2 + \left(-7x + \frac{11}{2}x\right)^2}$$

1pt

$$= \sqrt{4x^2 + \frac{9x^2}{4}} = \sqrt{\frac{25}{4}x^2} = \frac{5}{2}|x| \quad , \quad x<0 \quad |x| = -x$$

$$= -\frac{5}{2}x$$

1pt

1pt

Question 8.

Find the center and the radius of the circle $2x^2 + 2y^2 - 8x + 4y = 1$

$2x^2 - 8x \quad + 2y^2 + 4y \quad = 1$

$x^2 - 4x \ldots + y^2 + 2y \ldots = \frac{1}{2} \ldots$

$\underbrace{x^2 - 4x + 4} + y^2 + 2y + 1 = \frac{1}{2} + 4 + 1$ ... 1pt

$(x-2)^2 + (y+1)^2 = \frac{11}{2}$ ... 1pt

Circle with Center $= (2, -1)$ ... 1pt

and radius $= \sqrt{\frac{11}{2}} = \frac{\sqrt{22}}{2}$ ... 1pt