King Fahd University of Petroleum and Minerals

Dammam Community College

Code
A

Term 171

Prep Mathematics – Math 011

Class Test 1

October 16th, 2017

Time allowed 60 Minutes

Name: _____ **ID #** _____ **Section:** _____

This test consists of six 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	/6
2	/6
3	/6
4	/4
5	/4
6	/6
Total marks	/32

Question 1. Given the following sets,

$A = \{x \mid x \text{ is an odd composite number } \leq 25\}$
$B = \{y \mid y = 2n+1 \text{ and } n \text{ is a prime number } <8\}$
$C = \{x \mid x \leq 3 \text{ and } x \neq 0\}$ and $D = \{x \mid -6 \leq x < 8\}$

a) Find $A \cup B$ and $A \cap B$

$A = \{9, 15, 21, 25\}$ ✓0.75 $B = \{5, 7, 11, 15\}$ ✓0.75

$A \cap B = \{15\}$ ✓0.75 $A \cup B = \{5, 7, 9, 11, 15, 21, 25\}$ ✓0.75

b) Write in interval notation $C \cup D$ and $C \cap D$

$C = (-\infty, 0) \cup (0, 3]$ or ✓0.75

$D = [-6, 8)$ or ✓0.75

$C \cap D = [-6, 0) \cup (0, 3]$ ✓0.75

$C \cup D = (-\infty, 8)$ ✓0.75

Question 2.

a) For $-3 < x < -2$ write the expression $-|x+2|-|x-2|+\sqrt{(x-2)^2}+|-x|$ without the absolute value symbol.

$x+2 < 0 \Rightarrow |x+2| = -(x+2)$ ✓ 0.75

$x < 0 \Rightarrow -x > 0 \Rightarrow |-x| = -x$ ✓ 0.75

$-|x+2|-|x-2|+\sqrt{(x-2)^2}+|-x|$ ✓ 0.75

$= -|x+2| - \cancel{|x-2|} + \cancel{|x-2|} + |-x|$ ✓ 0.75

$= -[-(x+2)] - x = x+2-x = 2$ ✓ 0.75

b) Evaluate the expression:

$y^2 \div 2\left[x^3 - 3(x^2 - x)\right] + 1$, when $x = 2$ and $y = 4$

$4^2 \div 2\left[2^3 - 3(2^2 - 2)\right] + 1$ ✓ 0.75

$= 16 \div 2\left[8 - 3(4-2)\right] + 1$ ✓ 0.75

$= 8\left[8 - 3(2)\right] + 1$ ✓ 0.75

$= 8(2) + 1 = 17$ ✓ 0.75

✓

Question 3. Factor completely the following expressions

a) $2x^2 - 12x - 2y^2 + 18$

$2x^2 - 12x - 2y^2 + 18 = 2(x^2 - 6x - y^2 + 9)$ ✓0.75

$= 2[(x^2 - 6x + 9) - y^2]$ ✓0.75

$= 2[(x-3)^2 - y^2] = 2[(x-3-y)(x-3+y)]$

✓0.75 ✓0.75

b) $16(a+3)^3 + 54$

$16(a+3)^3 + 54 = 2(8(a+3)^3 + 27)$ ✓0.75

$= 2[(2(a+3))^3 + 3^3]$ ✓0.75

$= 2(2(a+3) + 3)((2(a+3))^2 - 2(a+3)(3) + 3^2)$ ✓0.75

$= 2(2a+9)(4(a+3)^2 - 6(a+3) + 9)$ ✓0.75

$= 2(2a+9)(4a^2 + 18a + 27)$

Question 4. Perform the multiplication and simplify.

a) $(x+3y)(x-3y)-(x-y)^2+(x+2y)(2x-y)$.

$= x^2 - 9y^2 - (x^2 - 2xy + y^2) + (2x^2 + 3xy - 2y^2)$ 0.5 0.5 0.5

$= x^2 - 9y^2 - x^2 + 2xy - y^2 + 2x^2 + 3xy - 2y^2$ 0.5

$= 2x^2 - 12y^2 + 5xy$ 0.5

b) $x^{3/2}(\sqrt{x}-\frac{1}{\sqrt{x}})$, where $x>0$

$x^{\frac{3}{2}}\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right) = x^{\frac{3}{2}}\left(x^{\frac{1}{2}} - x^{-\frac{1}{2}}\right)$ 0.5

$= x^2 - x.$ 0.5

Question 5.

a) Write each number in scientific notation

$0.0007029 = 7.029 \times 10^{-4}$ ✓ 1

$8367000000 = 8.367 \times 10^{9}$ ✓ 1

b) Simplify the expression $\left(-\frac{64}{27}\right)^{1/3}(-32)^{-4/5}\left(-81^{3/4}\right)$.

$\left(-\frac{64}{27}\right)^{\frac{1}{3}}(-32)^{-4/5}\left(-81^{\frac{3}{4}}\right)$

$= \left(\frac{(-64)^{\frac{1}{3}}}{(27)^{\frac{1}{3}}}\right)\left((-2)^{5\times -\frac{4}{5}}\right)\left(-(+3)^{4\times\frac{3}{4}}\right)$ ✓ 0.5

$= \left(-\frac{4}{3}\right)\left(\frac{1}{(-2)^4}\right)\left((-3)^3\right)$ ✓ 0.5

$= \frac{-\cancel{4}}{\cancel{3}} \times \frac{1}{\cancel{16}_{4}} \times -\cancel{27}^{9} = \frac{9}{4}$ ✓ 0.5

✓ 0.5

Question 6. Given that all variables represent positive real numbers, Simplify;

a) $\left(\frac{16m^3}{n}\right)^{\frac{1}{4}}\left(\frac{3^2n^{-1}}{m^2}\right)^{\frac{1}{2}} = \frac{16^{\frac{1}{4}}\, m^{\frac{3}{4}} \cdot 3^{2\times\frac{1}{2}}\, n^{-1\times\frac{1}{2}}}{n^{\frac{1}{4}}\; m^{2\times\frac{1}{2}}}$ ✓ 0.75

$= 2 \cdot m^{\frac{3}{4}} \cdot m^{-1} \cdot 3 \cdot n^{-\frac{1}{4}}\, n^{-\frac{1}{2}}$ ✓ 0.75

$= 6\, m^{-\frac{1}{4}} \cdot n^{-\frac{3}{4}}$ ✓ 0.75

$= \frac{6}{m^{\frac{1}{4}} \cdot n^{\frac{3}{4}}}$ ✓ 0.75

b) $x^2\sqrt[3]{128x^5y^7} - y^2\sqrt[3]{-54x^{11}y}$ ✓ 0.75

$= x^2\sqrt[3]{(2^2)^3 \cdot 2x^3 \cdot x^2y^3y^3y} - y^2\sqrt[3]{2(-3)^3x^3x^3x^3x^2 \cdot y}$

$= 2^2x^2 \cdot x\, y^2 \sqrt[3]{2x^2 \cdot y} - y^2(-3)x^3 \cdot \sqrt{2x^2y}$ ✓ 0.75

$= 4x^3y^2\sqrt[3]{2x^2y} + 3x^3y^2\sqrt[3]{2x^2y}$ ✓ 0.75

$= 7x^3y^2\sqrt[3]{2x^2y}$ ✓ 0.75