

**King Fahd University of Petroleum and Minerals  
Dammam Community College**

**MATH 011 – College Algebra I**

**Class Test One**

Written Exam, Term 092

March 20, 2010

Write your name, ID number and section number.

Name: \_\_\_\_\_ ID # \_\_\_\_\_ Sec # \_\_\_\_\_

**This exam consists of Eight questions.**

Total \_\_\_\_\_/30.

Time allowed: One hour and fifteen minutes.

You must show all necessary steps of your solution.

Calculators are not allowed.

This test worth 7.5% of the total marks allocated to this course.

Question	Marks
1	/3
2	/3
3	/4
4	/4
5	/4
6	/3
7	/4
8	/5
<b>Total marks =</b>	<b>/30</b>

**1. Rationalize the denominator of the expression:** [3 marks]

$$\frac{\sqrt{3} + 2\sqrt{2}}{3\sqrt{2} + 2\sqrt{3}}$$

$$\begin{aligned}\frac{\sqrt{3} + 2\sqrt{2}}{3\sqrt{2} + 2\sqrt{3}} \cdot \frac{3\sqrt{2} - 2\sqrt{3}}{3\sqrt{2} - 2\sqrt{3}} &= \frac{3\sqrt{6} - 2 \times 3 + 6 \times 2 - 4\sqrt{6}}{9 \times 2 - 4 \times 3} \\ &= \frac{6 - \sqrt{6}}{6} = 1 - \frac{\sqrt{6}}{6}\end{aligned}$$

**2. Factor completely the expression:** [3 marks]  
 $64 + (x - 3)^3$

$$\begin{aligned}4^3 + (x - 3)^3 &= (4 + (x - 3)) \left[ 4^2 - 4(x - 3) + (x - 3)^2 \right] \\ &= (4 + x - 3) \left[ 16 - 4x + 12 + x^2 - 6x + 9 \right] \\ &= (1 + x) \left[ x^2 - 10x + 37 \right]\end{aligned}$$

**3. If  $a = 3$  and  $b = -5$ , then find the value of the expression [4 marks]**

$$\frac{b-a\left(2-\frac{b-3}{b-7}\right)}{(b-a)\left(\frac{4a}{-b-1}\right)}$$

$$\frac{-5-3\left[2-\frac{-5-3}{-5-7}\right]}{(-5-3)\left[\frac{4\times 3}{5-1}\right]} = \frac{-5-3\left[2-\frac{-8}{-12}\right]}{(-8)\left[\frac{12}{4}\right]} = \frac{-5-3\left[2-\frac{2}{3}\right]}{(-8)[3]}$$

$$= \frac{-5-3\times\frac{4}{3}}{-24} = \frac{-5-4}{-24} = \frac{-9}{-24} = \frac{3}{8}$$

**4. Simplify the following expression: [4 marks]**

$$\frac{|5 - |3\pi - 10|| - (\pi + 1)}{-|\pi - 3|}$$

$$3\pi - 10 < 0 \Rightarrow |3\pi - 10| = -(3\pi - 10)$$

$$\pi - 3 > 0 \Rightarrow |\pi - 3| = \pi - 3$$

$$\therefore \frac{|5 - |3\pi - 10|| - (\pi + 1)}{-|\pi - 3|} = \frac{|5 + 3\pi - 10| - \pi - 1}{-\pi + 3} = \frac{|-5 + 3\pi| - \pi - 1}{-\pi + 3}$$

$$-5 + 3\pi > 0 \Rightarrow |-5 + 3\pi| = -5 + 3\pi$$

$$\text{Hence, the expression} = \frac{-5 + 3\pi - \pi - 1}{-\pi + 3} = \frac{2\pi - 6}{-\pi + 3} = \frac{2(\pi - 3)}{-(\pi - 3)} = -2$$

5. Simplify the following expression:

[4 marks]

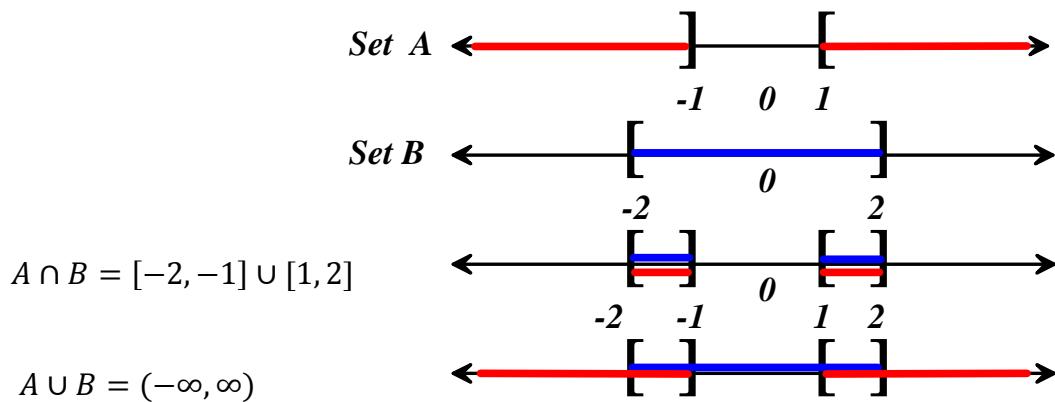
$$\frac{2x - 7 + \frac{4}{x+1}}{2x + 7 - \frac{3}{x+1}}$$

$$\begin{aligned} & \frac{\left(2x - 7 + \frac{4}{x+1}\right)}{\left(2x + 7 - \frac{3}{x+1}\right)} \times \frac{(x+1)}{(x+1)} \Rightarrow \frac{(2x-7)(x+1)+4}{(2x+7)(x+1)-3} \Rightarrow \frac{2x^2 - 5x - 7 + 4}{2x^2 + 9x + 7 - 3} \\ & \Rightarrow \frac{2x^2 - 5x - 3}{2x^2 + 9x + 4} \Rightarrow \frac{(2x+1)(x-3)}{(2x+1)(x+4)} \Rightarrow \boxed{\frac{x-3}{x+4}}. \end{aligned}$$

6. If  $A = \{x|x \geq 1\} \cup \{x|x \leq -1\}$  and  $B = \{x|-2 \leq x \leq 2\}$ , then find  $A \cap B$ , and  $A \cup B$ . Give your answer in interval notations.

[3 marks]

**Solution:**



**7. For  $x > 0$  and  $y > 0$ , Simplify the following expression:** [4 marks]

$$\left[ \frac{2(9x^4y^{-1})^2(3x^2y^3)^{-4}(2x^3y)^0}{4(2xy^{-2})^{-1}(4x^{-6}y^9)^2} \right]^{-\frac{1}{2}}$$

**Solution:**

$$\text{Expression} = \left[ \frac{(2xy^{-2})(9x^4y^{-1})^2 \cdot 1}{2(3x^2y^3)^4(4x^{-6}y^9)^2} \right]^{-\frac{1}{2}}$$

$$= \left[ \frac{2xy^{-2} \cdot 81x^8y^{-2}}{2 \cdot 81x^8y^{12} \cdot 16x^{-12}y^{18}} \right]^{-\frac{1}{2}}$$

$$= \left[ \frac{x \cdot x^{12}}{y^4 \cdot 16y^{30}} \right]^{-\frac{1}{2}}$$

$$= \left[ \frac{16y^{34}}{x^{13}} \right]^{\frac{1}{2}}$$

$$= \frac{4y^{17}}{\sqrt{x^{13}}}$$

8. Simplify the following expression:

[5 marks]

$$\frac{1-2x}{3+x} + \frac{15x^2+11x-12}{25x^2-9} \div \frac{3x^2+13x+12}{10x^2+11x+3}$$

$$= \frac{1-2x}{3+x} + \frac{15x^2+11x-12}{25x^2-9} \cdot \frac{10x^2+11x+3}{3x^2+13x+12}$$

$$= \frac{1-2x}{3+x} + \frac{(3x+4)(5x-3)}{(5x-3)(5x+3)} \cdot \frac{(2x+1)(5x+3)}{(x+3)(3x+4)}$$

$$= \frac{1-2x}{3+x} + \frac{2x+1}{x+3} = \frac{1-2x+2x+1}{x+3} = \boxed{\frac{2}{x+3}}$$