



Prince Sultan University
Department of Mathematical Sciences

MATH 001
Major I Examination
Semester I, Term 161
Tuesday, November 01, 2016
Time Allowed: 90 minutes

Student Name: _____

Student ID #: _____

Section #: _____

Teacher's Name: _____

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard.
6. Looking around or making an attempt of cheating may cause you expulsion from the Exam.
7. This examination has 10 problems, some with several parts and a total of 5 pages including the cover page. Make sure your exam paper has all these pages with all the problems.

Problems	Max points	Student's Points
1 , 2 , 3 , 4 , 5	18	
6 , 7	23	
8 , 9	19	
10	20	
Total	80	

20

Q.1 (3 points) **Evaluate** $\frac{|x-1|}{3} - \frac{xy}{1+y}$, for $x = -2$ and $y = 1$

Q.2 (3 points): Let $A = \{0, 4.56, \sqrt{18}, 51, -3\pi, 0.\overline{13}, \sqrt{64}, -9\}$

(You may use the same number more than one time)

- a) List all the rational numbers.
- b) List all the irrational numbers.
- c) List all the integers.

Q.3 (6 points) **Simplify** each of the following expressions **as much as possible**.
(Assume variables represent nonnegative real numbers.)

a) $-3\sqrt{50x^5} + 2x\sqrt{32x^3}$

a) $\left[\frac{20x^2y^6}{5x^6y^{-3}} \right]^{-3}$

Q.4 (3 points) **Rationalize** the denominator. $\frac{5}{2+\sqrt{5}}$

Q.5 (3 points) **Evaluate** $\frac{x^2+11}{3-x}$ for $x = 4i$. Write the answer in standard form $(a + bi)$.

Q.6 (4+4+4+3+3 points) **Factor and simplify** the following expressions completely.

a) $3x^3 - 2x^2 - 12x + 8$

b) $64x^3 + 27$

c) $7x^4 - 7$

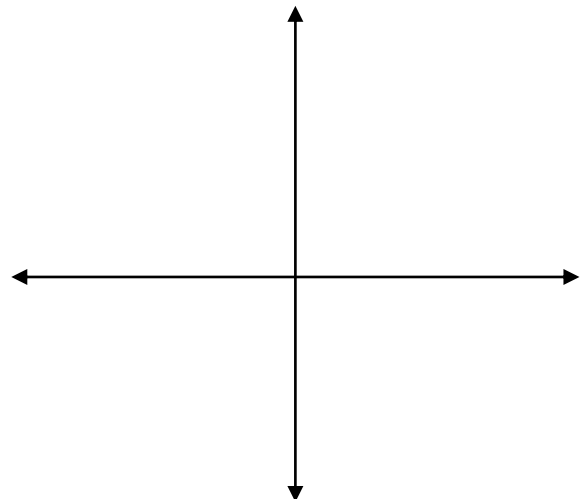
d) $(x+1)^{-1} - 5(x+1)^{-2}$

e) $6x^2 - 11x - 10$

Q.7 (5 points):

a) **Graph** the equation $y = -|x| + 3$

b) Give the **x-intercepts** and the **y-intercepts** of the graph.



Q.8 (16 points) **Perform** the indicated operation(s) and **simplify as much as possible**.

a) $(3xy^2 - 4y)(3xy^2 + 4y)$

b) $\frac{15x^2 + 10}{x - 7} \div \frac{12x^2 + 8}{x^2 - 49}$

c) $\frac{5}{x^2 + x} - \frac{10}{x^2 - 1}$

d) $(2x + 5)^2$

Q.9 (3 points) Find **all numbers that must be excluded from the domain** of the rational expression:

$$\frac{x - 1}{x^2 + 11x + 10}$$

Q.10 (20 points) Find the **solution set** of each of the following equations.

a) $2(x-1)+3=x-2(x+1)$

b) $3(x-4)^2=15$

c) $\frac{4}{x+2} + \frac{3}{x} = \frac{-8}{x^2+2x}$

d) $x^2=2x+4$ (Use **Completing the Square** method)

e) $x^2-4x+13=0$ (Use **the Quadratic Formula**)