



Prince Sultan University
Department of General sciences/Mathematics
MATH 001 Final Examination
Term 171

Monday, January 01, 2018

Time Allowed: 3 hours

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 to cheat will result in your exam being cancelled.
7. This examination has 16 problems, some with several parts and a total of 8 pages including the cover page. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2,3	18	
4	12	
5,6,7,8	17	
9	16	
10,11	12	
12,13,14	14	
15,16	11	
Total	100	

40

Q.1 (12 points) Perform the indicated operations and **simplify**.

a)
$$\sqrt[3]{\frac{(3^2 x^{-1})^2 y^6 z^4}{3x^4 z}}$$

b)
$$\sqrt{48x^4y} - 2x^2\sqrt{12y} + x^2\sqrt{27y}$$

c)
$$(2x - 3y)^2$$

Q.2 (3 points) Find the equation (**in slope intercept form**) of a line passing through the point $(6, -2)$ and has slope $\frac{4}{3}$.

Q.3 (3 points) Find the **values of** k in the quadratic equation $x^2 + 4kx + 5 = 0$ if the **discriminant** is 12

Q.4 (12 points) Solve each of the following equations. Give the solution set.

a) $2[2x - 1 + 3(x + 3)] = 6x + 4$

b) $\frac{6x}{x+3} = \frac{2x}{x+3} + \frac{4x^2 + 36}{x^2 - 9}$

c) $2x^2 - 12x - 8 = 0$

Q.5 (4 points) Find the **value of** k if the line $kx + 3y - 6 = 0$ is perpendicular to the line passing through $(4, -2)$ and $(-8, 4)$.

Q.6 (4 points) Let $f(x) = \frac{9}{x^2 - 1}$ and $g(x) = \sqrt{x - 1}$,find

a) $(f \circ g)(x)$

b) $(g \circ f)(2)$

Q.7 (4 points) Find the **inverse function** $f^{-1}(x)$ for $f(x) = \frac{x + 2}{x - 3}$

Q.8 (5 points) Use the graph of the function f to determine each of the following:

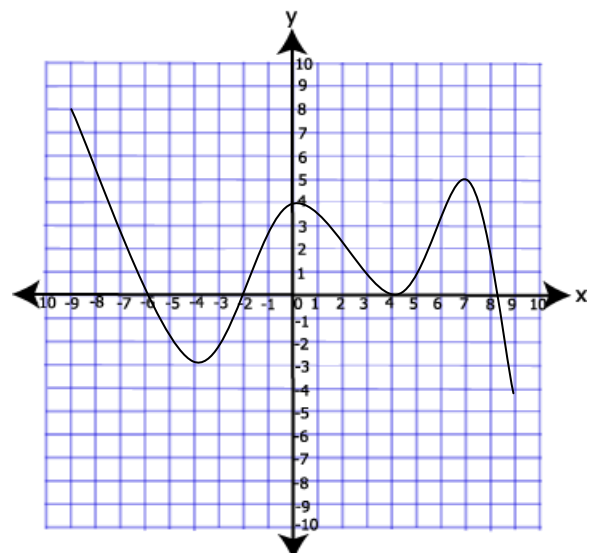
a) The **domain** of f

b) $f(-3)$

c) The intervals on which f is **increasing**, if any

d) Any relative maximum.

e) Does the function f have an inverse? **Explain.**



Q.9 (16 points) Solve the inequality. **Graph** the solution set on a **real number line** and give the solution set in **interval notation**.

a) $-3 \leq \frac{2x+5}{3} < 6$

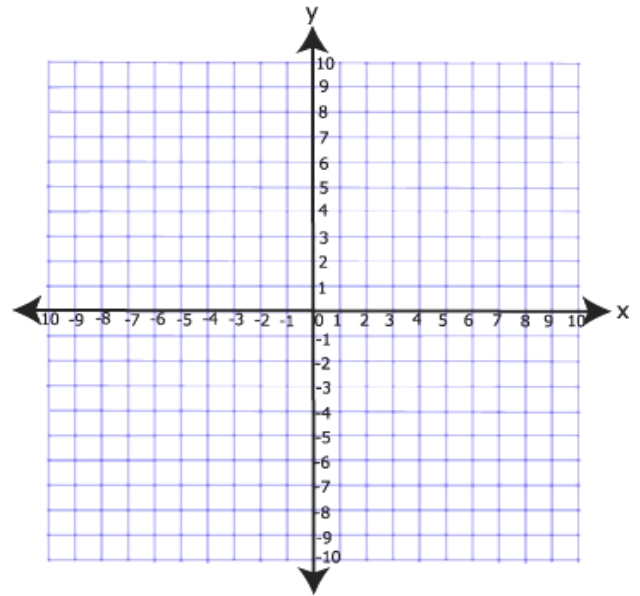
b) $|5x+6| \geq 4$

c) $4x^3 + 7x^2 > 2x$

d) $\frac{x^2-8}{x+1} \leq 4$

Q.10 (7 points) Consider $f(x) = -2x^2 + 4x + 6$ for answering the following questions.

a) Find the **coordinates of the vertex** of the graph of f



b) Find the **equation of the axis (line) of symmetry**.

c) Use the **vertex** and **the intercepts** to **graph** f

d) Give the **range** of f .

Q.11 (5 points) Use **synthetic division** to solve the equation: $x^4 - 4x^3 - 9x^2 + 16x + 20 = 0$
given that 5 is a zero of the function $f(x) = x^4 - 4x^3 - 9x^2 + 16x + 20$

Q.12 (5 points) Use the given equation of the circle to find the circle's **center and radius**.

$$x^2 + y^2 - 4x + 10y + 13 = 0$$

Q.13 (5 points) Find a **4th degree polynomial** function with real coefficients that has the zeros:
3 (with multiplicity 2) and $2i$; and with $f(1) = -100$.

Q.14 (4 points) Use **long division** to divide $4x^5 - 2x^3 + 5x^2 - 10$ by $x^2 + 1$.
(Write the **quotient** and the **remainder**)

Q.15 (3 points) Find the **domain** of the function: $f(x) = \frac{1}{x-4} + \frac{1}{\sqrt{7-x}}$

Q.16 (8 points) Given the polynomial $P(x) = 2x^3(x-1)^2(x+2)^4$.

- Find the **degree** of the polynomial.
- Determine the **end behavior** of the polynomial.
- Find the **zeros** of the polynomial and their **multiplicities**.

- Sketch** the graph of the polynomial
(Show all the details.)

