Prince Sultan University
Department of General sciences/Mathematics
MATH 001
Final Examination
Term 161
Sunday, January 22, 2017
Time Allowed: 180 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 to cheat will result in your exam being cancelled.
7. This examination has 14 problems, some with several parts and a total of 7 pages. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2	18	
3	20	
4,5,6,7	17	
8,9	18	
10,11,12	15	
13,14	12	
Total	100	

40

Q.1 (15 points) **Perform** the indicated operations and **simplify**.

a) $\left(\dfrac{-8a^{-6}b^{7}}{4a^{2}b^{-3}}\right)^{3}$

b) $\sqrt{2x^{3}}+3x\sqrt{8x}\quad ;\, x>0$

c) $\left(-3+\sqrt{-7}\right)^{2}$

d) $(3x-4)(3x+4)(9x^{2}+16)$

e) $\dfrac{3}{x^{2}-2x-8}\div\left(\dfrac{1}{x-4}-\dfrac{1}{x+2}\right)$

Q.2 (3 points) If $(6,-2)$ is a point on a line and the line's slope is $-\dfrac{5}{3}$. Find the $y-$intercept.

Q.3 (20 points) Solve each of the following equations. **Give the solution set.**

a) $5(x-2)-3(1-x)=x-2(x+3)$

b) $x^2(x-6)-4(x-6)=0$

c) $\dfrac{5}{2x-4}+\dfrac{1}{x^2-2x}=\dfrac{3}{2x}$

d) $-3|4x-7|+15=0$

e) $4x^4=13x^2-9$

Q.4 (6 points) Use the graph of the function *f* to determine each of the following:

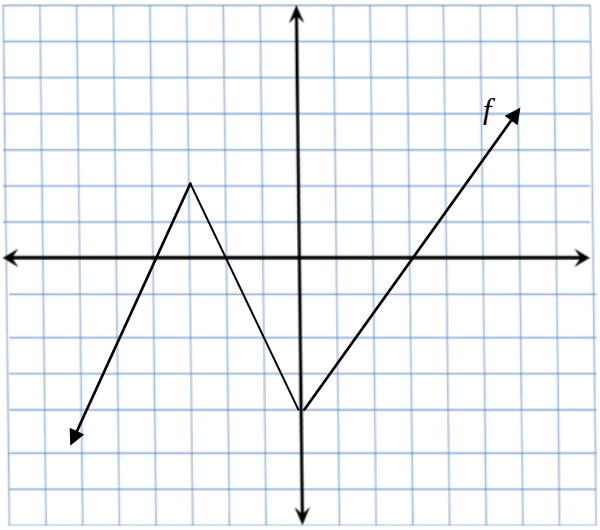
a) The domain of f

b) $f(-1)$

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

d) Any relative maximum.

e) Use the given graph of f to graph $g(x) = -f(x-2)+3$ (on the same coordinate plane)



Q.5 (4 points) Let $f(x) = 4x-3$ and $g(x) = 3x^2-2$,find

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

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

Q.6 (4 points) **Divide** using the synthetic division. Give the **Quotient** and the **Remainder**.

$$\left(2x^5-3x^3+4x-6\right) \div \left(x+2\right)$$

Q.7 (3 points) **Determine** whether the two functions f and g are **inverses of each other.**

(Show your work).

$f(x) = \sqrt[3]{x-5}$; $g(x) = x^3+5$

Q.8 (6 points) Solve the equation $2x^4 - x^3 - 13x^2 + 5x + 15 = 0$ Given that -1 is a zero of $f(x) = 2x^4 - x^3 - 13x^2 + 5x + 15.$

Q.9 (12 points) Solve the inequality. **Graph** the solution set on a real number line and give the solution in **interval notation**.

a) $5 < 4x - 3 \leq 21$

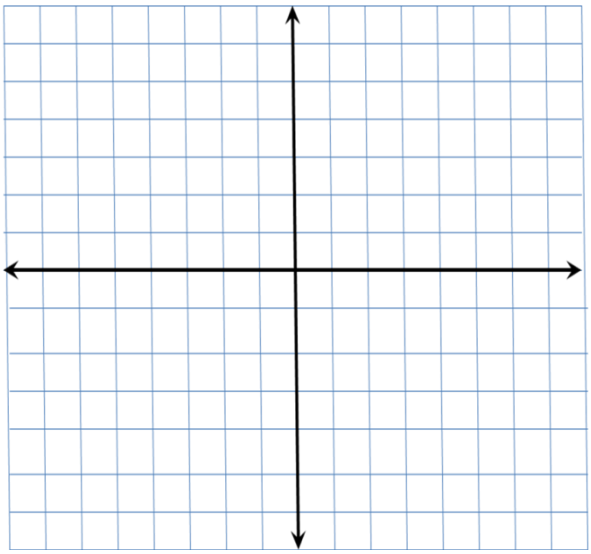
b) $|5x + 6| \geq 4$

c) $2x^2 > 3x$

d) $\dfrac{3x+1}{x-2} \leq 2$

Q.10 (6 points) Consider $f(x) = -x^2 - 4x - 3$ for answering the following questions.

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



b) Does the graph have a maximum or a minimum? Give its value.

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

d) Find the range of f.

Q.11 (5 points) Find the third-degree polynomial $f(x)$, with real coefficients that has 2, and $-3i$ as zeros and such that $f(1) = -40$

Q.12 (4 points) Find the domain of the function: $f(x) = \dfrac{1}{\sqrt{4x^2 - 9x + 2}}$

Q.13 (4 points) Find an **equation** of the circle with **center** $(-2,5)$ and passes through $(3,-2)$

Q.14 (8 points) **Graph** the polynomial function $f(x)=-2x^2(x-1)^4(x+2)$.
(**Show all the necessary details)**.