Prince Sultan University
Department of Mathematical Sciences

MATH 001
Major II Examination
Semester I, Term 161
Tuesday, December 20, 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 13 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	22	
6 , 7 , 8	19	
9 , 10 , 11	21	
12 , 13	18	
Total	80	

20

Show all your steps

Q.1 (4 points) Consider the two points $(2,-5)$ and $(-6,3)$

a) Find the distance between the two points

b) Find the mid-point of the line segment joining the two points

Q.2 (5 points) Write the standard form of the equation of the circle and **find the center and the radius**.

$$x^2 + y^2 - 10x + 6y - 30 = 0$$

Q.3 (6 points): Use the given conditions to write **<u>an equation</u>** of the line in **<u>slope-intercept form.</u>**

a) the line passes through $(3,-5)$ and has a slope $-\frac{2}{3}$

b) the line passing through $(-2,4)$ and perpendicular to the line whose equation is $5x+3y=4$

Q.4 (4 points): Find the inverse function , $f^{-1}(x)$, for $f(x)=\sqrt[3]{x-4}$

Q.5 (3 points) Find the **<u>domain</u>** of $f(x)=\frac{\sqrt{x+3}}{x-2}$

Show all your steps

Q.6 (9 points) **Solve** each of the following inequalities. Express the solution set in **interval notation** and on **the number line.**

a) $7x+7 \le 3(x+5)$

b) $|2x+5| < 11$

c) $-2|x+7| \le -24$

Q.7 (6 points): Given $f(x)=2x-1$ and $g(x)=x^2+x-2$

a) Find $(f+g)(x)$

b) Find $(\frac{f}{g})(x)$

c) Find the domain of $(\frac{f}{g})(x)$

Q.8 (4 points) Given $f(x)=x^2+4$ and $g(x)=\sqrt{x-1}$

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

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

Show all your steps

Q.9 (4 points) Determine whether the function $f(x) = 2x^2 + x^4 + x$ is even , odd, or neither? **Explain**

Q.10 (12 points) Solve each of the following equations.

a) $\sqrt{2x-3} + 3 = x$

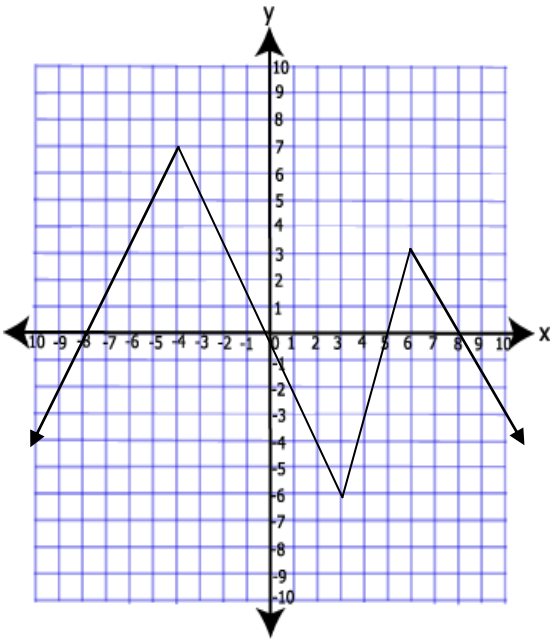
b) $2x^3 - x^2 - 18x + 9 = 0$

c) $2|x-3| - 6 = 10$

Q.11 (5 points) Find the Difference Quotient, $\frac{f(x+h) - f(x)}{h}$ for $f(x) = x^2 + 5$ **(Simplify)**

Show all your steps

Q.12 (12 points) Use the graph of $f(x)$ given in the figure to answer the following questions:



a) Find the Domain of f ._____

b) Find the range of f _____

c) Find the $x-$intercepts _____

d) Find the $y-$intercepts _____

e) Find intervals on which f is increasing, if any

_____

f) Find intervals on which f is decreasing, if any

_____

g) Find the **points,** if any, where f has a relative maximum

_____

h) Find the **points,** if any, where f has a relative minimum _____

i) Determine whether f is even, odd, or neither.(Give the reason _____

_____

j) Determine whether f has an inverse.(Explain) _____

_____

k) $f(-6) =$ _____

$f(2) =$ _____

Q.13 (6 points): **Begin** by graphing $f(x) = |x|$ and use transformations to **graph** $g(x) = -2|x-2|+1$.
Sketch all the steps of the transformations and find y-intercept, if any, for the last one.