Prince Sultan University
Department of General Sciences
MATH 001Final Examination
Semester 2, Term 162
Monday May 15, 2017, **Time Allowed: 3 hours**

Student Name: _____

Student ID #: _____ Section_____

Instructor's Name _____

Class Time_____

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. If your mobile phone is seen or heard, your exam will be taken immediately.
6. You must show all your work beside the problem. Be organized.
7. You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.
8. This examination has 18 problems. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1-3	20	
5-6	22	
7-10	16	
11-15	20	
16-18	22	
Total	**100**	
Total	**40**	

Q1) [12 points] Simplify the following expressions

a) $2+3\left[2\left(2x-5\right)-4(3-2x)\right]$

b) $\left(\dfrac{3x^{2}y^{-3}z}{9x^{-1}y^{0}z^{2}}\right)^{2}$

c) $\dfrac{\sqrt{5}}{2+3\sqrt{5}}$

d) $\dfrac{1+\dfrac{3}{2x}}{1-\dfrac{5}{x}}$

Q2) [4 points] Expand and simplify $\left(x-2y\right)^{3}$

Q3) [4 points] Write $\dfrac{-15-\sqrt{-18}}{33}$ in standard form $a+bi$. **Show all your steps.**

Q4) [6 points] Factorize the following expressions completely:

a) $y^3 - 125$

b) $(x+1)^{\frac{2}{3}} + (x+1)^{-\frac{1}{3}}$

Q5) [4 points] Solve the equation $2x^2 - 8x - 30 = 0$

Q6) [12 points] Solve the following equations:

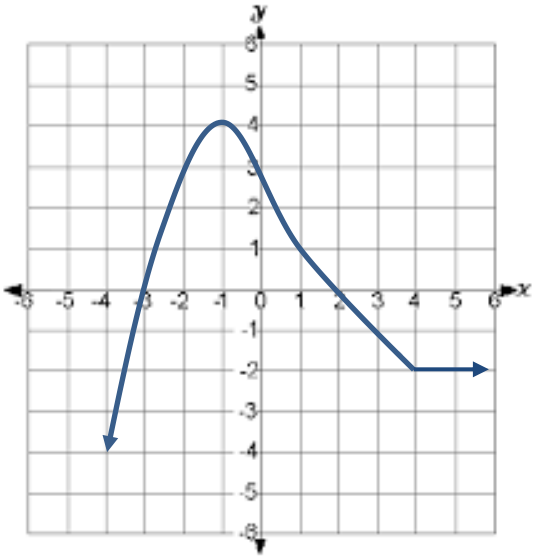
a) $\frac{1}{x-4} - \frac{5}{x+2} = \frac{6}{x^2 - 2x - 8}$

c) $x^{\frac{2}{3}} - x^{\frac{1}{3}} - 29 = 1$

d) $(x^2 - x - 4)^{3/4} - 2 = 6$

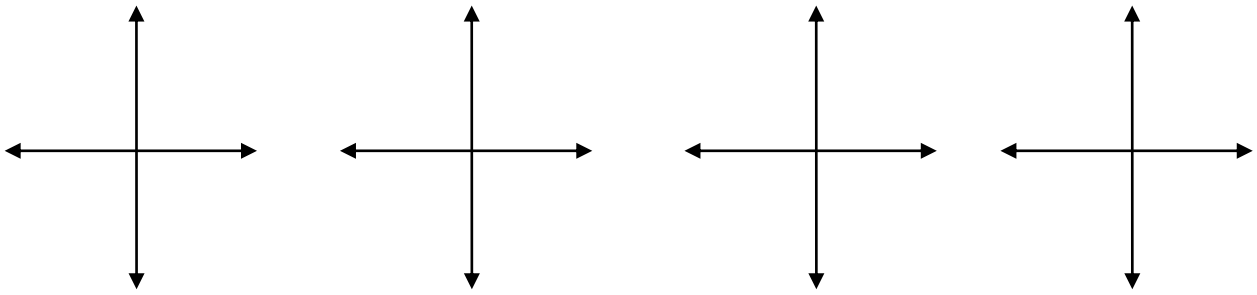
Q7) [4 points] Consider the following graph of the function $f(x)$, then answer the questions below:

Find:	Answer
a) the range of $f(x)$	
b) the *y* intercept	
c) the interval on which $f(x)$ is increasing	
d) the interval on which $f(x)$ is constant	



Q8) [4 points] Find the equation **(in Slope-Intercept form)** of the line that passes through $(2,3)$ and $(6,8)$

Q9) [4 points] Use transformations of $f(x)=|x|$ to sketch $g(x)=-|x+2|-1$. **Show all your steps.**



Q10) [4 points] Given that $f(x)=x^2-5x+2$ and $g(x)=3x-3$, find and simplify:

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

b) $(f\circ f)(1)$

Q11) [4 pts] Solve the absolute value inequality $-4|2x+1|+5<-7$ **. Graph the solution on a number line.**

Q12) [4 pts] Given that $f(x)=\sqrt[3]{2x-1}$ find $f^{-1}(x)$, the inverse of $f(x)$.

Q13) [4 pts] Given the two points $(3,-4)$ and $(8,10)$

a) Find the distance between the two points

b) Find the coordinates of the midpoint between the two points

Q14) [4 pts] Find the equation of a circle which has a center at $(2,-2)$ and a **diameter** of 6 units.

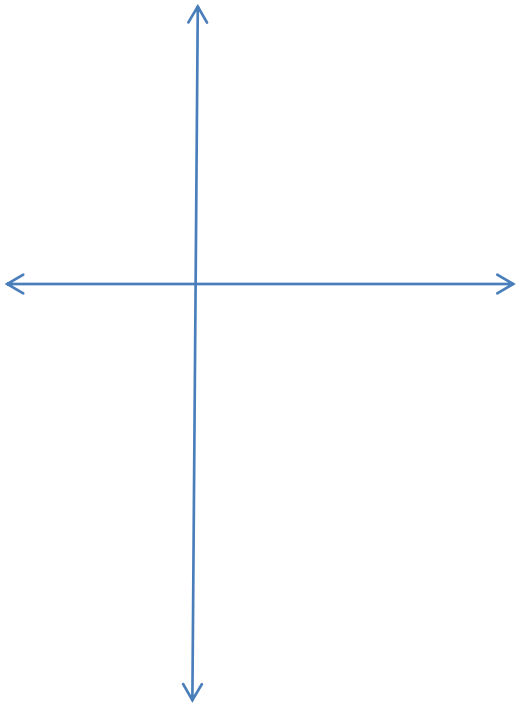
Q15) [4 pts] Given that $f(x)=4x^3+2x+3$, use the **<u>Remainder Theorem</u>** to find $f(1)$

Q16) [10 pts] Consider the function $f(x) = x^2 - 2x - 15$

a) Determine whether $f(x)$ opens up or down.

b) Find the coordinates of the vertex of $f(x)$.

c) Find the x (if any) and y intercepts of $f(x)$



d) Draw a graph of $f(x)$

e) State the Domain and the Range of $f(x)$.

Q17) [4 pts] Solve the equation: $x^3 + 4x^2 - 11x - 30 = 0$ given that -5 is a zero of this equation.

Q18) [8 pts] Solve and graph the solution set of:

a) $2x^2 + x - 6 > 0$

b) $\frac{x-3}{-x+5} \geq 0$