Prince Sultan University
Orientation Mathematics Program
MATH 001
Final Examination
Semester I, Term 071
Monday, January 21, 2008
Time Allowed: 150 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 18 problems, some with several parts. Make sure your paper has all these problems.

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

1. (4 points) Evaluate the algebraic expression $\frac{|2x|+y}{xy-2x^3}$, for $x=-2$ and $y=4$.

2. (6 points) Simplify each of the following expressions. Assume that all variables represent positive numbers.

(i) $\left(\frac{-30a^{14}b^8}{30\,a^{17}b^{-2}}\right)^3$

(ii) $\sqrt[3]{54xy^3}-y\sqrt[3]{128x}$

3. (3 points) Simplify $(4i)^2\cdot\left(\frac{-12+\sqrt{-28}}{32}\right)$ and write the result in the standard form.

4. (3 points) Factor completely: $5x^3-45x$

5. (12 points) Perform the indicated operations and simplify

(i) $(3x-4)^3$

(ii) $\dfrac{x^2+x-12}{x^2+x-30}\cdot\dfrac{x^2+5x+6}{x^2-2x-3}\div\dfrac{x+3}{x^2+7x+6}$

(iii) $\dfrac{3}{5x+2}-\dfrac{5x}{25x^2-4}$

(iv) $(7x^3+5)(x^2-2)$

6. (6 points) Solve the following inequalities **and** <u>write the answer in the interval form</u>

(i) $4(3x-2)-3x<3(1+3x)-7$

(ii) $4+\left|3-\dfrac{x}{3}\right|\geq 9$

7. (12 points) Solve each of the following equations.

(i) $x^2 - 6x + 13 = 0$

(ii) $\frac{2x}{x-5} = \frac{6}{x-5} + 4$

(iii) $x - 13\sqrt{x} + 40 = 0$

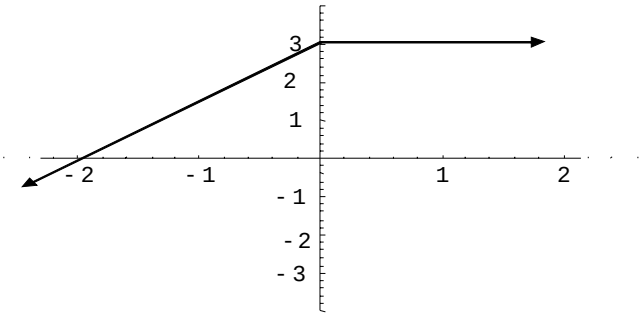
8. (4 points) Use the graph to determine

a) The domain of f

b) The range of f

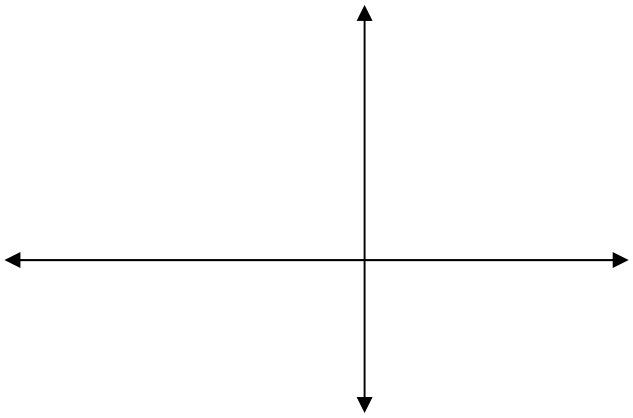
c) The $x-$ intercept(s)

d) The $y-$intercept



9. (5 points) (i) Find the center **and** radius of the circle whose equation is: $x^2 + y^2 + 8x - 2y - 8 = 0$.

(ii) Sketch the graph of the circle.



10. (4 points) Write an equation of the line passing through $(-3,-1)$ and $(2,4)$

11. (3 points) Find the domain of $f(x) = \frac{1}{x-8} + \frac{3}{x^2-100}$

12.(5 points) Find an equation for $f^{-1}(x)$ if $f(x) = \frac{2x-7}{x+1}$

13. (5 points) Let $f(x) = 4 - x$ and $g(x) = 2x^2 + x + 5$ Find and simplify each of the following:

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

(ii) $(g \circ f)(7)$

14. (2 points) Use the leading Coefficient test to determine the end behavior of the graph of the polynomial function: $f(x) = -x^4 - 6x^2 + x + 3$

15. (6 points) **Use synthetic division** to show that 5 is a solution of the equation: $x^4 - 4x^3 - 9x^2 + 16x + 20 = 0$. Then solve the polynomial equation.

16. (6 points) Find the third degree polynomial function with real coefficients satisfying that: 1 and 5i are zeros; and $f(-1) = -104$.

17.(5 points) Solve the inequality and graph the solution set on a real number line. Express the solution set in interval notation.

$$\frac{1}{x-3} \leq 1$$

18. (9 points) Let $f(x)=\frac{2x^2}{x^2-1}$

(i) Write the equation of the horizontal asymptote, if any.

(ii) Write the equation(s) of the vertical asymptote(s), if any.

(iii) Find the Domain of the rational function $f(x)$

(iv) Find x and y intercepts

(v) Graph the function: $f(x)$ by showing all details.