Prince Sultan University
Orientation Mathematics Program

MATH 001

Final Examination

Semester II, Term 062

Monday, June 4, 2007

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 19 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2	16	
3,4,5,6	14	
7,8	15	
9,10,11,12	15	
13,14,15	13	
16,17	11	
18,19	16	
Total	100	

1. (4 points) Simplify each of the following expressions. Assume that all variables represent positive numbers.

(i) $(49x^{-2}y^{4})^{\frac{-1}{2}}\ (x\ \ y^{\frac{-1}{2}})$

(ii) $\dfrac{\sqrt[4]{162x^{5}}}{\sqrt[4]{2x}}$

2. (12 points) Perform the indicated operations and simplify

(i) $(2x+3)^{3}$

(ii) $\dfrac{1+\dfrac{1}{x}}{3-\dfrac{1}{x}}$

(iii) $\dfrac{x^{2}-14x+49}{x^{2}-49}$

(iv) $\dfrac{4}{x^{2}+6x+9}+\dfrac{4}{x+3}$

3. (3 points) Factor completely: $20x^2 + 27x - 8$

4. (3 points) Simplify: $\frac{i(2+3i)}{2+i}$. Write the result in the standard form.

5. (2 points) Solve the absolute value equation $|x+1| + 5 = 3$

6. (6 points) Solve the following absolute value inequalities and write the answer in the interval form

(i) $-3|x+7| \geq -27$

(ii) $3 \leq |2x - 1|$

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

(i) $(x+1)^2 = -2$

(ii) $3(x-4)^2 = 15$

(iii) $4x^2 = 2x + 7$

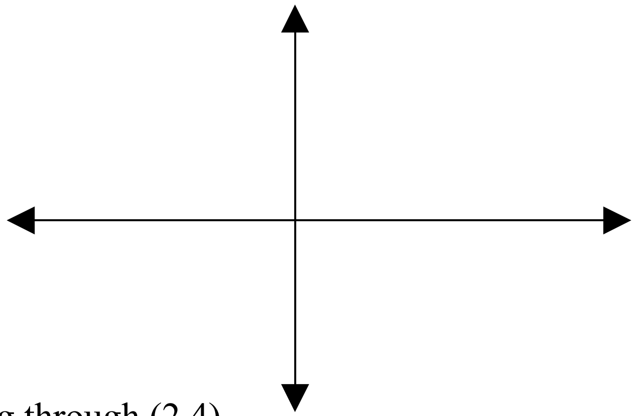
(iv) $\dfrac{x+6}{3x-12} - \dfrac{5}{x-4} - \dfrac{2}{3} = 0$

8. (3 points) Determine whether $f(x) = x\sqrt{1-x^2}$ is even, odd, or neither.(Explain)

9. (4 points) (i) Find the center and radius of the circle whose equation is:

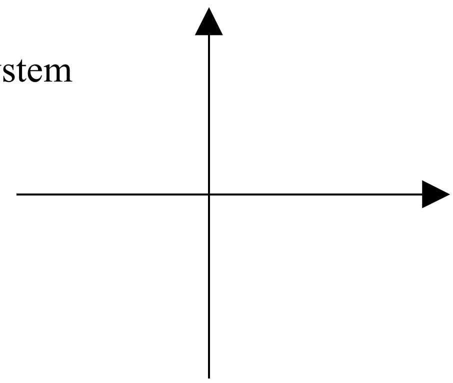
$$x^2 - 2x + y^2 - 15 = 0.$$

(ii) Sketch the graph of the circle.



10. (4 points) (i) Write an equation of the line passing through (2,4) with $x -$ intercept $= -2$

(ii) Graph the line on the rectangular coordinate system



11. (4 points) Determine the value of A so that the line whose equation is $Ax + y - 2 = 0$ is perpendicular to the line containing the points $(1,-3)$ and $(-2,4)$.

12. (3 points) Find the domain of $f(x) = \sqrt{x-2} + \sqrt{x+3}$

13. (2 points) Find the coordinates of the vertex for the parabola $f(x) = 2x - x^2 - 2$.

14. (6 points) Let $f(x) = \dfrac{x}{x+1}$ and $g(x) = \dfrac{4}{x}$. Find and simplify each of the following:

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

(ii) $(g \circ f)(1)$

(iii) $f^{-1}(x)$

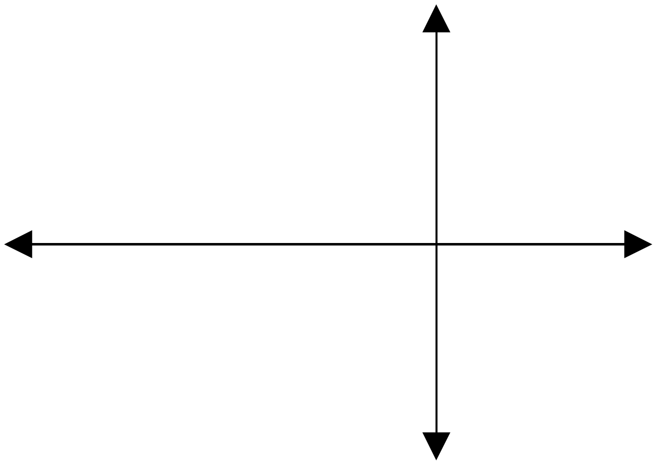
15. (5 points) (i) Use synthetic division to divide $f(x) = x^3 - 4x^2 + x + 6$ by $x + 1$.

(ii) Find all the zeros of $f(x)$

16. (6 points) Let $f(x) = x^3 + 7x^2 - 4x - 28$.

(i) Find the zeros for $f(x)$, give the multiplicity for each zero, and state whether the graph crosses the $x-axis$ or touches it and turns around, at each zero.

(ii) Sketch the graph of $f(x)$



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

$$\frac{x-2}{x+2} \le 2$$

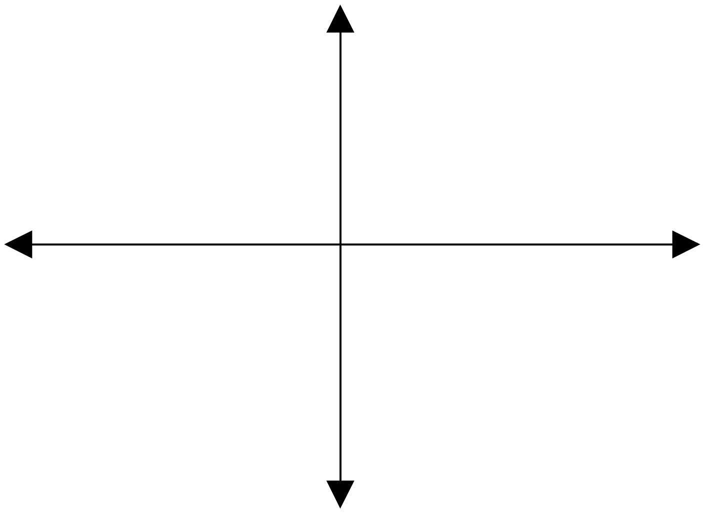
18. (6 points) Let $f(x) = \dfrac{2}{x^2 + x - 2}$

(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 $f(x)$

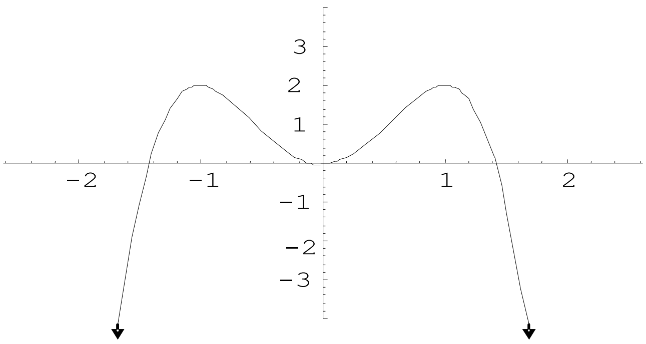
(iv) Graph the function $f(x)$.



19. (10 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

e) The intervals on which f is increasing, if a

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

g) Whether f is even, odd, or neither? (Explain)

h) The coordinates of the relative maxima, if any

i) The coordinates of the relative minima, if any

j) $f(0)$ and $f(1)$