Prince Sultan University
Department of Mathematics and Physical Sciences

Math 001 Final Examination
Semester I, Term 121
Wednesday, January 9, 2013
Time Allowed: 120 minutes

Student Name: _____ ID #: _____

Instructor's Name _____ Sec. No._____

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. You must show all your work beside the problem. Be organized.
6. You may use the back of the pages for extra space, but be sure to indicate that on the page of the problem.
7. This examination has 14 problems. Make sure your paper has all these problems.

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

1. (8 points) Write each of the following in the simplest form.

i) $\left(\dfrac{x^{\frac{-5}{4}}}{-3x^{\frac{-3}{4}}} \right)^{-2}$

ii) $\dfrac{\sqrt[3]{250x^3y^5z^7}}{10xyz}$

2. (8 points) Perform the operation and simplify.

i) $\dfrac{x^2-9}{x^3+27} \div \dfrac{5x-15}{x^2-3x+9}$

ii) $(4x+4y)^2-(4x-4y)^2$

3. (4 points) Simplify $\left(8+\sqrt{-9}\right)(2-i)-3(1-i)^2$. **(Do not use the calculator)**

4. (10 points) Solve each inequality. Express each solution set in **interval notation**.

   i) $14-5x \geq -6$

   ii) $|2x-4| \geq 2$

   iii) $\dfrac{x-1}{2x-1} \geq 1$

5. (10 points) Solve each equation:

   i) $\dfrac{x}{2}-3=3-2x$

   ii) $(3-x)(2x+1)-(3-x)(x-4)=0$

   iii) $9x^4-2x^2+\dfrac{1}{9}=0$

6. (4 points) Write the **slope-intercept form** $(y = mx + b)$ of the line passing through the point $(-2,1)$ and parallel to the line whose equation is $3x - 4y = 1$.

7. (4 points) Find the inverse function $f^{-1}(x)$ for $f(x) = \dfrac{-3}{1+x}$.

8. (6 points) Find the distance between the point $(1,2)$ and the center of the circle whose equation is $x^2 + y^2 + 2y - 4x + 1 = 0$.

9. (6 points) Let $f(x) = x^2 + 1$ and $g(x) = \sqrt{x-1}$, find the following:

   i) $\left(\dfrac{g}{f}\right)(2)$

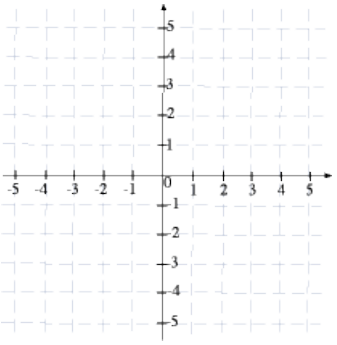
   ii) Domain of $f + g$

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

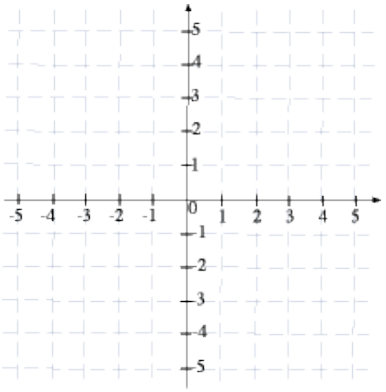
10. (5 points) Use synthetic division to divide $2x^4 - 18x$ by $x - 4$. Determine the quotient and the remainder.

11. (15 points) Graph each of the following equations in the rectangular coordinate system.

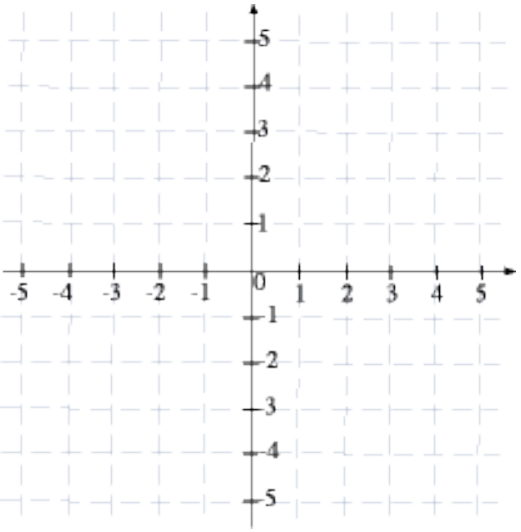
i) $f(x) = 2x - 4$



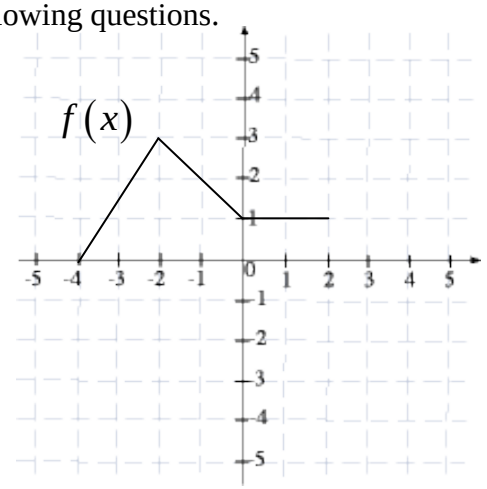
ii) $f(x) = (x-2)^2 - 1$



iii) $f(x) = (x-2)^2(x+1)$



12. (12 points) Use the given graph of $y = f(x)$ to answer the following questions.

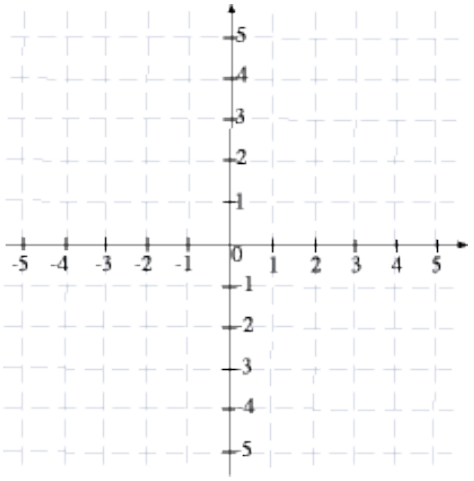


i) What is $f(-2) - f(1)$?

ii) What is the relative maximum of f?

iii) On which interval is f increasing?

iv) Graph $g(x) = -f(x-2) + 1$.



13. (4 points) Solve the equation $x^3 - x^2 + 9x - 9 = 0$ given that 1 is a solution of this equation.

14. (4 points) Find the domain of the function $f(x) = \sqrt{(x^2 - 4)(x - 2)}$.