Prince Sultan University
Department of Mathematics and Physical Sciences

Math 001 Final Examination
Semester II, Term 112
Wednesday, May 23, 2012
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. 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 16 problems. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2,3,4	22	
5,6	20	
7,8,9	18	
10,11	12	
12,13	14	
14,15,16	14	
Total	100	

1. (4 points) Simplify the following $18x^2 + 4 - \left[6\left(x^2 - 2\right) + 5\right]$

2. (4 points) Simplify the following $\left(\dfrac{x^{-3}y^4z^{\frac{7}{3}}}{x^2y^{-3}z^{\frac{4}{3}}}\right)^2$

3. (6 points) Given that $Y_1 = \dfrac{2x-1}{x^2+2x-8}$, $Y_2 = \dfrac{2}{x+4}$ and $Y_3 = \dfrac{1}{x-2}$, find all the values of x which satisfy $Y_1 + Y_2 = Y_3$

4. (8 points) Solve the following:

   i) $\quad 4x^3 - 12x^2 = 9x - 27$

   ii) $\quad \sqrt{2x+13} - 7 = x$

5. (12 points) Solve the following:

   i) $3|2x-1|-5=16$

   ii) $3x^2-2x=2$

   iii) $\dfrac{x-4}{6} \geq \dfrac{x-2}{9} + \dfrac{5}{18}$

6. (8 points) Find the following and express your answer in standard form:

   i) $\left[(7-3i)(2+2i)\right]+(3-2i)^2$

   ii) $\dfrac{3-4i}{2+7i}$

7. (4 points) Write the equation of the line passing through the point $(-2,1)$ and $(-3,11)$

8. (10 points) Given that point A is $(6,-9)$ and point B is $(0,-3)$

    i) Find the distance between A and B

    ii) Find the coordinates of the midpoint between A and B

    iii) Write the equation of the circle with diameter segment AB

9. (4 points) Find the inverse function $f^{-1}(x)$ for $f(x) = -5x - 3$.

10. (8 points) Let $f(x) = x^2 - x$ and $g(x) = x - 1$, find the following:

    i) $(f - g)(x)$

    ii) $(f \times g)(x)$

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

    iv) $(f \circ f)(3)$

11. (4 points) Determine the end behavior of the polynomial $f(x) = -2(x+3)^2(x+4)(x+1)^3$. Find the zeroes of the polynomial and state whether the graph crosses or touches and turns around the x-axis for each zero. **Do not draw the graph.**

12. (10 points) Graph the quadratic function $f(x) = 2x^2 - 8x - 3$. Find the domain, the range, the intercepts, the vertex, the maximum or minimum and the intervals where it increases or decreases.
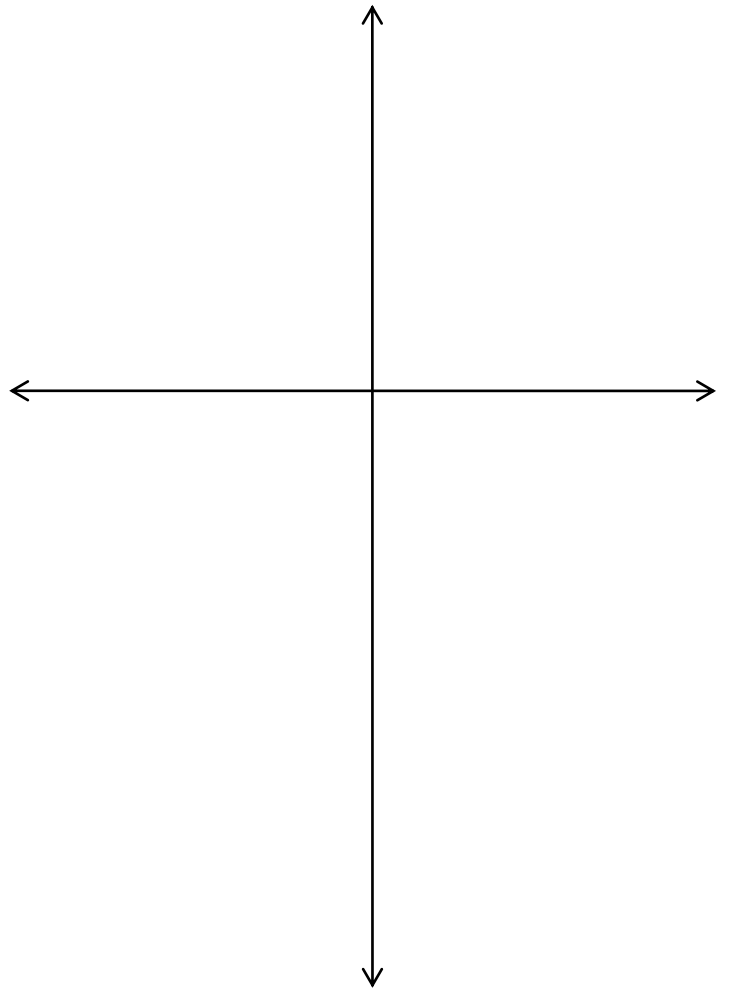
13. (4 points) Given that $f(x) = x^4 - 5x^3 - 5x^2 - 5x - 6$, use the synthetic division and the Remainder Theorem to find $f(2)$.

14. (4 points) Solve the equation $2x^3 - 5x^2 + x + 2 = 0$ given that 2 is a zero of this equation.

15. (6 points) Find a fifth-degree polynomial function with real coefficients that has 1, -1, 2 and $1+i$ as zeros and such that $f(0) = 4$

16. (4 points) Find the domain of the function $f(x) = \dfrac{\sqrt{2x^2 - 5x + 2}}{x - 7}$