Prince Sultan University
Orientation Mathematics Program
MATH 001
Final Examination
Semester I, Term 061
Monday, January 22, 2007
Net 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 20 problems, some with several parts.. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2,3	15	
4	16	
5,6,7,8	15	
9,10,11,12	14	
13,14,15	14	
16,17,18	14	
19,20	12	
Total	100	

1. (4 points) Simplify each of the following expressions

(i) $(x^3+64)(2x^2-5x)$

(ii) $\sqrt[3]{24xy^3}-y\sqrt[3]{81x}$

2. (9 points) Perform the indicated operations and simplify

(i) $(5-2i)^2$

Q20/1.4

(ii) $\dfrac{x^2-4}{x^2+3x-10}\div\dfrac{x^2+5x+6}{x^2+8x+15}$

Q30/p6

(iii) $\dfrac{3}{x+3}=\dfrac{5}{2x+6}+\dfrac{1}{x-2}$

Q44/1.2

3. (2 points) Determine whether the equation $x^2+y^2=25$ defines y as a function of x

Q16/2.1

4. (16 points) Solve each of the following equations.

(i) $(2x-5)(x+1)=2$

Q92/1.5

(ii) $x^3+5x^2-4x-20=0$

Q/P.5

(iii) $\sqrt{2x+19}-8=x$

Q19/1.6

(iv) $(y-\frac{10}{y})^2+6(y-\frac{10}{y})-27=0$

Q60/1.6

5. (3 points) Solve the following inequality and write the answer in the interval form

$$3<-4x-3\le 19$$

Q/1.7

6. (4 points) Let $f(x)=-3x^2+x-1$. Find and simplify the difference quotient:

$$\frac{f(x+h)-f(x)}{h},\quad h\neq 0$$

Q16/2.2

7. (4 points) Find the center and radius of the circle whose equation is

$$x^2+y^2-4x+2y-4=0$$

Q103/Rev. 2.8

8. (4 points) Solve the inequality and graph the solution set of on a real number line:

$$\frac{1}{x+1}\ge\frac{2}{x-1}$$

Q64/3.6

9. (4 points) Write an equation of the line passing through $(-3,6)$ and **perpendicular** to the line whose equation is $y=\frac{1}{3}x+4$. Graph the two lines in the same rectangular coordinate system.

Q36/Rev. 2.4

10.(4 points) Let $f(x)=\frac{\sqrt{x-2}}{x-5}$.

(i) What is the domain of $f(x)$.

(ii) Find the $y-$intercept.

Q27/2.6

11. (3 points) Show that the polynomial function $f(x)=3x^3-10x+9$ has a real zero between -3 and -2.

Check7/3.2

12. (3 points) Use the Leading Coefficient Test to determine the graph's end behavior for: $f(x)=-11x^4-6x^2+x+3$.

.

Q24/3.2

13. (6 points) Given $f(x)=2-5x$ and $g(x)=\frac{2-x}{5}$, find and simplify each of the following:

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

(ii) $(f\circ g)(3)$

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

2.7

14. (4 points) Let $f(x) = 3x^2 - 6x$.

(i) Determine, without graphing, whether the function has a minimum value or a maximum value, (Why?).

(ii) Find the minimum value or maximum value and determine where it occurs.

(iii) Identify the function's domain and its range.

Q44/3.1

15.(4 points) Use the graph of the function $f(x) = \sqrt{x}$, to sketch the graph of the function $g(x) = -f(x+1)$.

Q72/2.5

16. (5 points) Use synthetic division to divide $f(x) = x^5 - 2x^4 - x^3 + 3x^2 - x + 1$ by $x - 2$. State the quotient $q(x)$ and the remainder $r(x)$.

Q32/3.3

17. (5 points) Find a third-degree polynomial function $f(x)$ with real coefficients that has -5, and $4 + 3i$ as zeros such that $f(2) = 91$.

Q27/3.4

18.(4 points) Solve the equation $3x^3 + 7x^2 - 22x - 8 = 0$ given that $\frac{-1}{3}$ is a root.

Q46/3.3

19. (4 points) Let $f(x) = (x-2)^3$

(i) Find an equation for $f^{-1}(x)$.

(ii) Use interval notation to give the domain and the range of f^{-1}.

20. (8 points) Let $f(x) = \frac{4x^2}{x^2+1}$.

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

(ii) Write the equations of the vertical asymptotes, if any.

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

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