Prince Sultan University
Orientation Mathematics Program

MATH 001
Final Examination
Semester II, Term 092
Thursday, June 10, 2010
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 17 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1	21	
2,3,4,5	16	
6,7	17	
8,9,10,11	15	
12,13,14	15	
15,16,17	16	
Total	100	

Q.1 (21 points, 1.5 each) Write **only the final answer** for each question:

#	Questions	Answers
1	Given $f(x)=x^2+2x+4$. Evaluate $f(10)$.	
2	Simplify $7(4x^2+3x)+2(5x^2+x)$.	
3	Given the circle equation $(x+2)^2+(y-5)^2=20$. Find the center and radius.	
4	Multiply $(2x+3y)^2$.	
5	Evaluate $(3+4i)(3-4i)$.	
6	Subtract $5\sqrt[3]{81}-4\sqrt[3]{3}$.	
7	Perform the operation $(x^3+7xy-5y^2)-(6x^3-xy+4y^2)$.	
8	Find the domain of the rational function $\frac{x+2}{2x(x+9)}$.	
9	Determine whether $f(x)=x^3+2$ is odd, even, or neither.	
10	Find the midpoint of the line segment with end points $(2,7)$ and $(-3,5)$.	
11	Given $f(x)=\sqrt{x+6}+5$ and $g(x)=3x+4$. Evaluate $(f\circ g)(x)$.	
12	Find the coordinates of the vertex for the parabola defined by the function $f(x)=-3x^2+12x-7$.	
13	What is the degree of the polynomial $f(x)=(x-1)(x+2)^2$.	
14	What is the inverse function $f^{-1}(x)$ for $f(x)=2x+9$.	

Show all steps for each question

Q.2 (4 points) Perform the indicated operations and simplify as much as possible the algebraic expression $\dfrac{x^2-25}{2x-2} \div \dfrac{x^2+10x+25}{x^2+4x-5}$.

Q.3 (2 points) Write the expression $6(-3+\sqrt{-25})$ in the standard form $a+bi$. (**Do not use a calculator).**

Q.4 (4 points) Find all values of x satisfying the condition $y_2 - y_1 = -12$ given that $y_1 = 3(2x+5)+4$ and $y_2 = 10(x-2)+15$.

Q.5 (6 points) Factor each of the following completely

i) $x^4(x-4)-81(x-4)$

ii) x^3+27

Q.6 (12 points) Solve each of the following equations. **(Do not use a calculator).**

i) $\frac{2}{x}+3=\frac{5}{2x}+\frac{13}{4}$

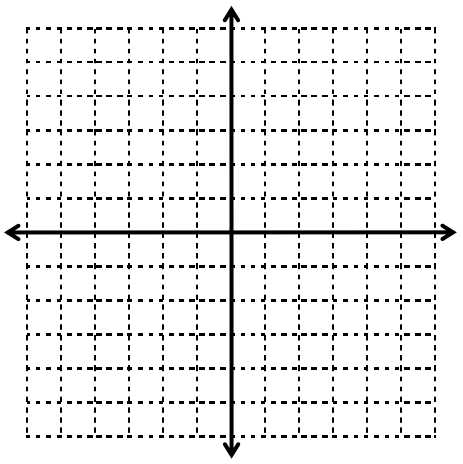
ii) $2x^3+3x^2=8x+12$

iii) $x^{\frac{2}{5}}-13=-9$

Q.7 (5 points) Solve the following rational inequality $\frac{x+4}{2x-1}\le 3$ and graph the solution set on a real number line .

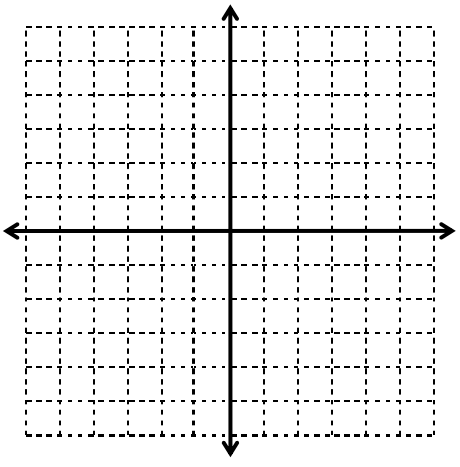
Q.8 (3 points) Find and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$ for the function $f(x)=5x-7$.

Q.9 (2 points) Use the intercepts to graph the linear equation $4x-2y+12=0$.



Q.10 (4 points) Write the equation of the straight line passing through $(-8,4)$ and perpendicular to the line whose equation is $y+2x=1$.

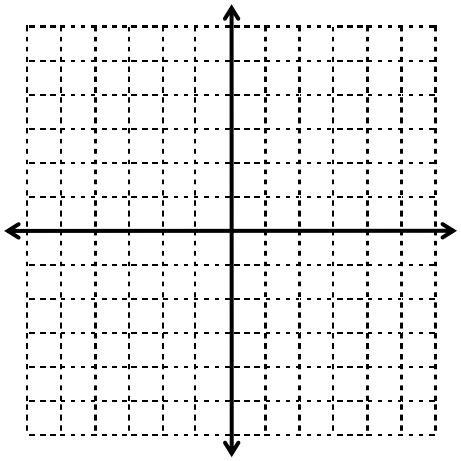
Q.11 (6 points) Use the graph of the basic function $f(x)=\sqrt{x}$ to graph the function $g(x)=2\sqrt{x+1}-1$.



Final graph of $g(x)$

Q.12 (6 points) Consider the quadratic function $f(x) = (x-3)^2 + 1$.

i. Give its domain, range and axis of symmetry and determine the minimum or maximum value.



ii. Sketch the graph.

Q.13 (3 points) Use the **Intermediate Value Theorem** to show that the polynomial function $f(x) = -2x^3 + 5x + 1$ has a real zero between 1 and 2.

Q.14 (6 points) Consider the polynomial function $f(x) = -2x^3(x-1)^2(x+5)$.

a. Use the **Leading Coefficient Test** to determine the end behavior of the graph of $f(x)$.

b. Find the zeros of the function and the multiplicity of each zero.

c. State whether the graph crosses or touches the *x*-axis at each zero.

Q.15 (3 points) Given $f(x) = 4x^2 + 3x^3 + 3 - 5x$. **Use the synthetic division** and the remainder theorem to find $f(-4)$.

Q.16 (5 points) Find a third degree polynomial function $f(x)$ with real coefficients that has 1 and $5i$ as zeros and such that $f(-1) = -104$.

Q.17 (8 points) consider the rational function $f(x) = \dfrac{-2}{x^2 - x - 2}$

i) Find the x and $y-$intercepts of the function (if there are any).

ii) Find the vertical and horizontal asymptotes of $f(x)$ (if there are any).

iii) Graph the function $f(x)$