



Prince Sultan University
Orientation Mathematics Program

MATH 001
Final Exam Saturday 4th Jan. 2014
Semester 131
Duration : 2 hours

Student Name: _____

Student ID #: _____ **Section #:** _____

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 exam.
5. Your exam will be taken immediately if your **mobile** phone is seen or heard..
6. This exam has 20 problems, 8 question pages and a cover page.

Problems	Max points	Student's Points
1-5	22	
6-10	22	
11-13	18	
14-17	20	
18-20	18	
Total	100	

1) (4 points) Simplify $18\left(x^2 - \frac{1}{2}\right) + 4 - [3(x^2 - 7) - 2]$

2) (4 points) Simplify $\left(\frac{\left(-2x^{-2}\right)^{-1}\left(x^2y^{\frac{3}{4}}\right)}{8x^{-\frac{2}{3}}}\right)^2$

3) (4 points) Factor completely $64x^3 - 8$

4) (6 points) Given that $A = \frac{5}{x+4}$, $B = \frac{3}{x+3}$ and $C = \frac{12x+19}{x^2+7x+12}$, find all the values of x satisfying $A+B=C$

5) (4 points) Rationalize the denominator: $\frac{2+\sqrt{5}}{3+i^2\sqrt{2}}$

6) (4 points) Solve $2x^2 - 5x - 9 = 0$ by using **the Quadratic Formula**.

7) (4 points) Write in the standard form: $(2-3i)(1-i) - (3-i)(3+i)$

8) (4 points) Solve $(x^2 - 3x)^{\frac{3}{2}} - 8 = 0$

9) (4 points) Solve $3|2x - 1| - 1 = 20$

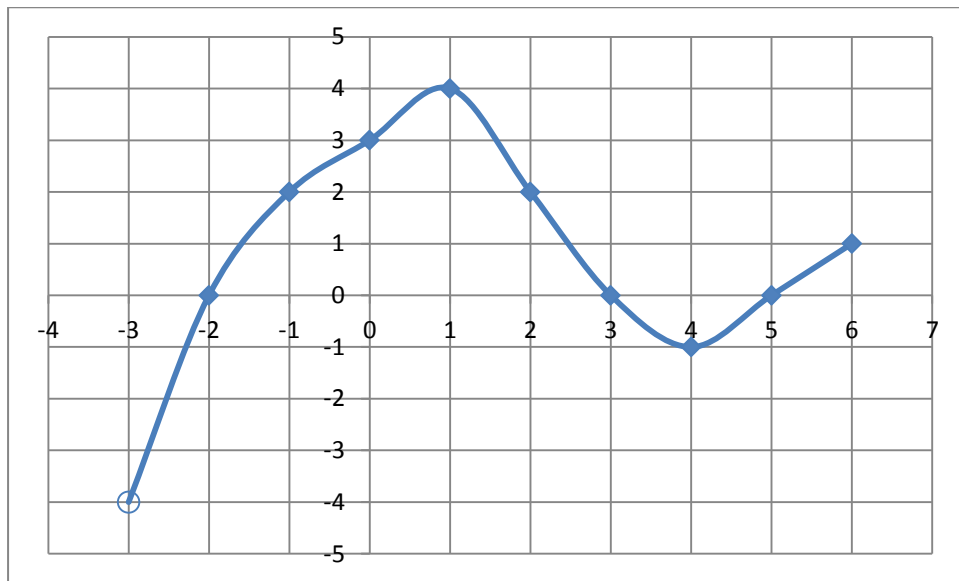
10) (6 points) Find the equation of the line that passes thorough (2,3) and is perpendicular to the line $4x + 2y = -4$.

11) (4 points) Find the inverse of the function $f(x) = \frac{3x-1}{x+3}$.

12) a) (4 points) If $f(x) = \sqrt{x-2}$ and $g(x) = x^2 + x$, find the function $(f \circ g)(x)$ **and** its domain.

b) (2 points) Find the minimum of the parabola $h(x) = x^2 + x - 2$.

13) (8 points) Use the graph of the function f to answer the following questions:



- a) the domain of f
- b) the range of f
- c) the x intercepts
- d) the y intercepts
- e) intervals on which f is increasing
- f) intervals on which f is decreasing
- g) the relative (local) maximum point of f
- h) the relative (local) minimum point of f

14) (4 points) Find the **midpoint** and the **length** of the line segment joining the points $(2, \sqrt{7})$ and $(8, 2\sqrt{7})$.

15) (6 points) Find the centre , the radius and the range of the circle:
 $x^2 + y^2 + 8x + 4y + 16 = 0$.

16) (4 points) Show that the polynomial $f(x) = 2x^4 - 4x^2 + 1$ has a real zero between -1 and 0 .

17) (6 points) Given the function $f(x) = -x^2(x+2)(x-2)$

a) Determine the end behaviour of the graph.

b) Find the **Multiplicity** and **x-Intercepts** and explain what happens at each intercept. **DON'T GRAPH.**

18) (6 points) Use **synthetic division and the Remainder Theorem** to find the value of $f(4)$ given that $f(x) = 2x^3 - 11x^2 + 7x - 5$

19) (6 points) Find a third degree polynomial that has 4 and $2i$ as zeros and $f(-1) = -50$

20) (6 points) Solve the rational inequality $\frac{x+4}{2x-1} \leq 3$