Prince Sultan University
Department of Mathematics and Physical Sciences

Math 001 Final Examination
Semester II, Term 132
Tuesday, May 27, 2014
Time Allowed: 120 minutes

Student's Name: _____ ID #: _____

Instructor's Name: _____ Sec. #:_____

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 19 problems. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2,3,4	20	
5,6,7,8	20	
9,10,11,12	22	
13,14,15	20	
16,17,18,19	18	
Total	100	

Q1. (4 points) Simplify the following $17x^4+18-2\left[\left(x^2-1\right)^2-4x^2\right]$

Q2. (4 points) Simplify the following $\left(\frac{x^2y\sqrt{z}}{xy^{-1}\sqrt{z^3}}\right)^3$

Q3. (6 points) Find all values of x such that $\frac{1}{x^2-3x+2}=\frac{1}{x+2}+\frac{4}{x^2-4}$

Q4. (6 points) i) Find the value of $z^2+\frac{z}{2}+1$, where $z=2+2\sqrt{3}\,i$.

ii) Simplify and write in the standard form $\frac{2+7i}{3-4i}$

Q5. (4 points) Solve the equation $3x^2 - 2x - 2 = 0$, **<u>without using a calculator.</u>**

Q6. (6 points) Solve the following equation $\sqrt{x+10} + 2 = x$

Q7. (4 points) Solve the following inequality $\left|2 - \frac{x}{2}\right| - 1 \leq 1$

Q8. (6 points) i) Write the equation **<u>(in point-slope and slope-intercept form)</u>** of the line passing through the point $(1,4)$ and $(-3,3)$

ii) Give the equation of a line that is perpendicular to $3x + 2y = 12$ passing through $(2,5)$

Q9. (6 points) Sketch the graph of $f(x)=|x|$ then use transformations to sketch $f(x)=-\frac{1}{2}|x-2|+3$

Show all the steps.

Q10. (6 points) Consider the points $A=(-9,6)$ and $B=(0,-3)$

i) Find the distance between *A* and *B*.

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

Q11. (4 points) Find the center and radius of a circle which has the equation $x^2+y^2-4x+6y+9=0$

Q12. (6 points) Given $f(x)=2x+3$ and $g(x)=2x^2+5x$, find the following:

i) $(f-g)(x)$ ii) $(g\circ f)(1)$ iii) $f^{-1}(x)$, the inverse of *f*

Q13. (10 points) Graph the quadratic function $f(x) = 2x^2 - 8x + 11$. Find the **domain,** the **range**, the **intercepts** and the intervals where it increases or decreases.

Q14. (6 points) Determine the end behavior of the polynomial $f(x) = -3(x-2)^5(x+4)^2(x-1)$. 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.**

Q15. (4 points) Given that $f(x) = x^4 + 5x^3 - 6x^2 + x - 1$ use the synthetic division and the Remainder Theorem to find $f(3)$

Q16. (4 points) Solve the equation $f\left(x\right)=x^3+2x^2-11x-12$ given that 3 is a zero of this equation.

Q17. (6 points) Find a fourth-degree polynomial function with real coefficients that has 1, -1 and $1+i$ as zeros and such that $f(0) = 10$.

Q18. (4 points) Find the domain of the function $f(x) = \sqrt{2x^2 - 5x + 2}$

Q19. (4 points) Solve the rational inequality $\frac{x-6}{x+4} \geq -2$