



Prince Sultan University
Department of Mathematical Sciences

MATH 001
Final Examination
Semester I, Term 151
Sunday, January 03, 2016
Time Allowed: 120 minutes

Student Name: _____

Student ID #: _____

Circle your section

Dr. Bahaa'		Dr. Aiman	Mr. Khaled		Dr. Jihad	Dr. Wasfi
8 ---- 9	9 ---- 10	11 ---- 12	8 ---- 9	11 ---- 12	10 ---- 11	9 ---- 10
93	83	85	82	91	84	94
Dr. Nabil		Dr. Thabet				
1--- 2 p.m.	2 --- 3 p.m.	1 — 2 p.m.	11 --- 12			
92	87	86	96			

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	14	
4 , 5 , 6	18	
7 , 8 , 9 , 10	17	
11	12	
12 , 13	15	
14 , 15 , 16 , 17	14	
18 , 19	10	
Total	100	

Q.1 (5 points) **Simplify** each of the following

a. $\left(\frac{12x^{-5}y^{-3}z^4}{3xy^{-3}z^{-4}} \right)^{-1}$

b. $\sqrt{18xy^4} - y^2 \cdot \sqrt{128x}$

Q.2 (4 points) **Factor and simplify** each of the following completely.

a. $3x^3y + 12x^2y^2 - 15xy^3$

b. $4x^4 - 64x^2$

Q.3 (5 points) **Perform** the indicated operations and write the result in **standard form**. (Show all your steps)

a. Evaluate $x^2 - 2x + 5$ for $x = 1 - i$

b. $\frac{5}{2 - \sqrt{-9}}$

Q.4 (3 points) **Find and simplify** the difference quotient, $\frac{f(x+h)-f(x)}{h}$ for $f(x) = 2x^2 - 2$

Q.5 (2+2+3+3 points) Perform the indicated operations and **simplify** each of the following:

a. $(3 - x^4)(3 + x^4)$

b. $(9x - 5y)^2$

c. $(3x - 2)^3$

d. $\frac{4}{x^2 + x - 2} + \frac{1}{x^2 + 5x + 6}$

Q.6 (5 points) Use the given conditions to **write an equation for the line**.

a) Passing through $(1, -5)$ with x -intercept = -1

b) Passing through $(-2, 4)$ and perpendicular to the line whose equation is $-3x + y - 9 = 0$

Q.7 (6 points) Let $f(x) = x^2 - 1$ and $g(x) = \sqrt{x - 1}$, find

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

(ii) $(f + g)(5)$

(iii) Domain of $\frac{g}{f}$

Q.8 (3 points) Find **the inverse** of the function: $f(x) = \frac{3}{x+4}$

Q.9 (4 points) Find the domain of the function $f(x) = \sqrt{x^2 - 4x - 45}$

Q.10 (4 points) Find an equation of the circle that passes through the point $(2, -1)$ and has its center at $(-3, 5)$.

Q.11 (12 points) Solve each of the following equations.

a. $2[3x - (4x - 1)] - 6(x - 1) = 0$

b. $3w^2 + 13w = 10$

c. $12x + 16 = 3x^3 + 4x^2$

d. $-3 + \sqrt{m + 59} = m$

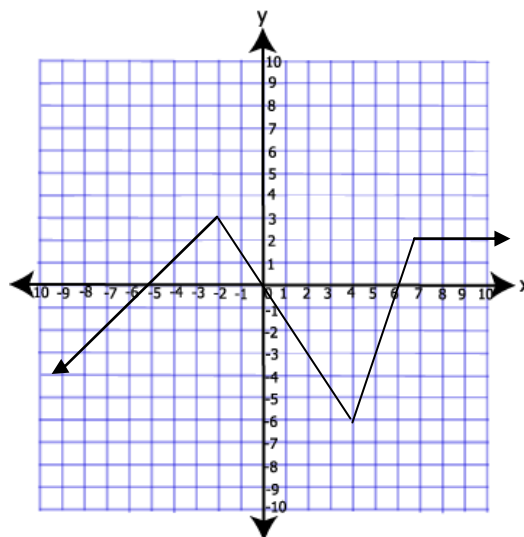
Q.12 (8 points) **Solve** each of the following inequalities and **graph** the solution set on a number line.
Express the solution set using **interval notation**.

a. $|3(x+1)| + 9 \geq 15$

b. $\frac{5x}{x-7} < x$

Q.13 (7 points) Use the graph of the function f to determine each of the following:

- The domain of f
- The range of f
- $f(-3)$
- The intervals on which f is increasing, if any
- Whether f is even, odd, or neither? (Give the reason)



Q.14 (3 points) Find the **coordinates of the vertex** of the graph of $f(x) = -x^2 - 4x + 5$ and determine whether it represents **a maximum or a minimum**.

Q.15 (3 points) Use synthetic division and the Remainder theorem to **find** $f(4)$ for $f(x) = 2x^4 - 11x^3 + 6x^2 - 6x + 53$.

Q.16 (4 points) Given that 5 is a zero of $f(x) = 2x^3 - 23x^2 + 71x - 30$. **Solve the equation:**
 $2x^3 - 23x^2 + 71x - 30 = 0$ (**find all the zeros of f**)

Q.17 (4 points) **Find a 4th degree polynomial** function with real coefficients that has the zeros:
 0 (multiplicity 2) and $-2i$ and such that $f(2) = -64$

Q.18 (5 points) Begin by graphing the square root function $f(x) = \sqrt{x}$, then **use transformations** of this graph to graph the function $g(x) = -3\sqrt{x+4} + 5$. (Show the x and y intercepts, if any).

Q.19 (5 points) Graph the polynomial function $f(x) = -6x^3(x-4)(x+1)^2$.

