



Prince Sultan University
Orientation Mathematics Program

MATH 001

Final Examination

Semester II, Term 072

Saturday, June 7, 2008

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 18 problems, some with several parts. Make sure your paper has all these problems.

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

Q1. (8 points) Simplify each of the following expressions. Assume that all variables represent positive numbers.

(i) $\left(\frac{-64a^6b^7}{4a^2b^3}\right)^3 \left(\frac{-15x^{14}y^8}{25x^3y^{-2}}\right)^0$

(ii) $3\sqrt{8a} - \sqrt{32a} + 3\sqrt{72a} - \sqrt{75b}$

Q2. (6 points) Factor completely each of the following:

(i) $3x^4 - 12x^2$

(ii) $(x+5)^{\frac{-1}{2}} - (x+5)^{\frac{-3}{2}}$

Q3. (4 points) Simplify $\frac{\frac{3}{x-2} - \frac{4}{x+2}}{\frac{7}{x^2-4}}$ as much as possible.

Q4. (9 points) Perform the indicated operations and simplify as much as possible

(i) $(3x^2 - 4)^3$

(ii) $(5x^3y + 4y)(5x^3y - 4y)$

(iii) $\frac{4x^2 + x - 6}{x^2 + 3x + 2} - \frac{3x}{x + 1} + \frac{5}{x + 2}$

Q5. (10 points) Solve each of the following equations:

(i) $3x^2 - 2x + 1 = 0$

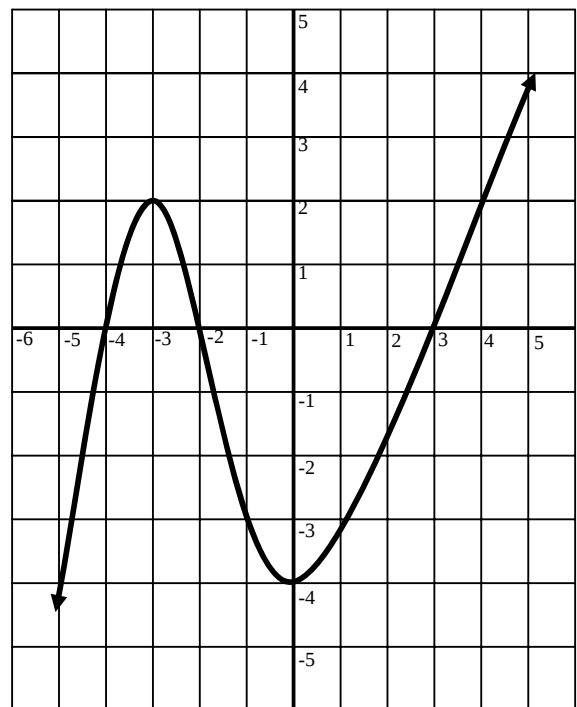
(ii) $(x + 3)^2 + 7(x + 3) - 18 = 0$

(iii) $2|3x - 2| = 14$

Q6. (8 points) Use the graph of $y = f(x)$ to:

- find the domain of $f(x)$
- find the relative maximum point of f
- find the x -intercepts
- find intervals of which f is increasing
- determine whether f even, odd or neither
- find the value of $f(1)$
- draw $g(x) = f(x - 1) + 2$ on the same coordinate system

Graph of $y = f(x)$



Q7. (3 points) Given $f(x) = 2x^2 - x + 3$ find and simplify $\frac{f(x+h) - f(x)}{h}$.

Q8. (5 points) Solve the following inequality. Give the answer in interval notation and graph the solution set on a number line $\frac{x+1}{x+3} < 2$.

Q9. (5 points) Write an equation of the line passing through $(4, -7)$ and perpendicular to the line whose equation is $x - 2y - 3 = 0$.

Q10. (4 points) Find the average rate of change of $f(x) = x^2 + 2x$ from $x_1 = 3$ to $x_2 = 5$.

Q11. (2 points) Find the domain of $f(x) = \frac{4}{\frac{3}{x} - 1}$.

Q12. (4 points) Determine whether the functions $f(x) = \frac{2}{x-5}$ and $g(x) = \frac{2}{x} + 5$ are inverses of each other or not.

Q13. (4 points) Find the midpoint of the line segment with endpoints $(8, 3\sqrt{5})$ and $(-6, 7\sqrt{5})$.

Q14. (6 points) Given the polynomial $f(x) = -3x^3(x-1)^2(x+3)$.

(i) Find the degree of the polynomial.

(ii) Determine the end behavior of the polynomial.

Q15. (5 points) Show that $f(x) = 3x^3 - 8x^2 + x + 2$ has a real zero between 2 and 3.

Q16. (4 points) Let $f(x) = \sqrt{x}$ and $g(x) = x - 1$. Find:

a) $(f \circ g)(2)$

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

Q17. (4 points) Solve the polynomial $f(x) = 2x^3 - 3x^2 - 11x + 6 = 0$ given that -2 is a zero of $f(x)$.

Q18. (9 points) Let $f(x) = \frac{3x^2}{x^2 - 4}$.

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

(ii) Write the equation(s) of the vertical asymptote(s), if any.

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

(iv) Find the x -intercept(s).

(iv) Graph the function $f(x)$ by showing all details.

