

MATHEMATICS 101 FINAL EXAM May 18, 2007

Name: _____

Instructor and section: _____

1. No calculators are allowed.
2. No notes or books are allowed.
3. Show your work and make your methods clear. Unjustified answers will receive no credit, except for true/false questions.

problem	worth	your score
1	20	
2	30	
3	35	
4	30	
5	20	
6	30	
7	30	
8	10	
TOTAL	205	

1. (2 points each) Are the followings true (T) or false (F) ?

(a) $(-1)^{13} = -13$

(b) $\sqrt{(-3)^2} = -3$

(c) $|4 - 12| = ||4| - |12||$

(d) Some real numbers are rational but not all rational numbers are real.

(e) Not every real number is a solution of the equation $\frac{x+1}{2} = \frac{x+1}{2}$.

(f) $\frac{3x-y}{3} = x-y$

(g) If $-5x > -25$ then $x < 5$

(h) If $x^2 = a$ then $x = \sqrt{a}$, (assume that $a > 0$)

(i) $3 - 36\sqrt[3]{3} = -33\sqrt[3]{3}$

(j) $(\sqrt[m]{a})^n = a^{\frac{n}{m}}$ (assume that $a > 0$)

2. (5 points each)

(a) Is the relation $y^2 = x^2$ a function of x ? Why, why not?

(b) Is the relation $y^3 = x^2$ a function of x ? Why, why not?

(c) Find the equation of the line through $(3, 4)$ and has zero slope.

(d) Find the equation of the line through $(-2, 3)$ that is perpendicular to the x -axis.

3. Find the solution sets of the followings:

(a) (10 points) $|-2x + 2| - 8 > 0$

(b) (15 points) $4 \leq 3 - 2x < 8$ OR $2 + 3x < x - 3$

(c) (10 points) Find two numbers such that two times the first plus the second is 50 and the first plus three times the second is 100.

4. Find the solutions of the followings:

(a) (10 points) $\frac{1}{t+3} + \frac{4}{t+5} = \frac{2}{t^2 + 8t + 15}$

(b) (10 points) $x\sqrt{2} = \sqrt{5x-2}$

(c) (10 points) $3p^2 = 6p + 4$

5. (a) (10 points) Add and write in lowest terms $\frac{2}{x^2 + 5x + 6} + \frac{2}{x^2 + 3x + 2}$

(b) (10 points) Simplify $\frac{m^{-1} + p^{-2}}{2m^{-2} - p^{-1}}$

6. Simplify the followings assuming that all variables represent positive numbers.

(a) (10 points) $2\sqrt[3]{128q^{11}} - 3q\sqrt[3]{54q^8}$

(b) (10 points) $\left(\sqrt[3]{\sqrt[4]{2^3}}\right)^4$

(c) (10 points) $\left(\frac{a^6b^{-2}}{2a^{-2}}\right)^{-1} \left(\frac{2b^{-1}a^2}{3b^{-2}}\right)^{-2}$

7. Find all the real number solutions, if any, to the following equations:

(a) (10 points) $8t^3 + 4t^2 - 8t = 4$

(b) (5 points) $(2x - 3)^2 + 121 = 0$

(c) (15 points) $x^5 - 5x^3 + 4x = 0$

8. (a) (10 points) Rationalize $\frac{3 - \sqrt[3]{2}}{(\sqrt[3]{5})^2}$

1 Answers

1. F,F,T,F,F,F,T,F,F,T

2. a) No b) Yes c) $y = 4$ d) $x = -2$

3. a) $(-\infty, -3) \cup (5, \infty)$ b) $(-\infty, -1/2]$ c) 10 and 30

4. a) no solutions b) $x = 1/2$ and $x = 2$ c) $p = 1 \pm \frac{\sqrt{21}}{3}$

5. a) $\frac{4}{(x+1)(x+3)}$ b) $\frac{m(p^2+m)}{p(2p-m^2)}$

6. a) $-q\sqrt[3]{2q^2}$ b) 2 c) $\frac{9}{2a^{10}}$

7. a) $t = \pm 1$ and $t = -1/2$ b) no real solutions c) $x = 0, x = \pm 2, x = \pm 1$

8. a) $\frac{3\sqrt[3]{5} - \sqrt[3]{10}}{5}$