

MIDTERM 2

Math 110 (Doherty)
November 17, 2006

Name _____

INSTRUCTIONS: PLEASE READ THIS FIRST:

1. Make sure you have a complete exam. The exam has 8 pages, counting this cover page.
2. Show all your work. Use the back of an adjacent page if you need more space.
3. You have 85 minutes.
4. You are not allowed to use a calculator of any kind. Exact answers (e.g., $\frac{13}{7}$) are preferable to decimal approximations.
5. If you have questions, raise your hand and I will assist you as soon as possible.

Good Luck.

Problem	Total Points	Score
1	9	
2	8	
3	6	
4	8	
5	15	
6	5	
7	12	
8	8	
9	5	
10	4	
11	10	
12	10	
Total	100	

1. (3 pts each) Simplify each expression. There should be no negative exponents in your answers.

(a) $\left(\frac{1}{2} - \frac{1}{3}\right)^{-2}$

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

(b) $(8^{2a-1})^{-1}(8^4)^a$

2. (4 pts each) Simplify each expression. There should be no negative exponents in your answers. You do not have to multiply out terms like 2^5 .

(a) $\frac{(-3x^{-3}y^2)(4xy^3)}{6x^{-5}y}$

(b) $(9m^{-5}n^3)\frac{(3m^{-2}n^3)^{-1}}{(3mn^{-2})^2}$

3. (3 pts each) Perform the indicated operation.

(a) $[2x + (y - 2)][2x - (y - 2)]$

(b) $(p^{2r} + q)(p^{4r} - p^{2r}q + q^2)$

4. (4 pts each) Factor each polynomial completely. If a polynomial is prime, say so.

(a) $7x^5 - 7x$

(b) $27x^{3y} - 1$

5. (5 pts each) Solve by factoring. State the solution set.

(a) $12x^3 + 5x^2 = 3x$

(b) $w^3 + 5w^2 - w - 5 = 0$

6. (5 pts) What is the domain of $\frac{3x - 2}{x^3 - x^2}$? State your answer in set notation and in interval notation.

7. (4 pts each) Perform the indicated operations, and express your answer in its simplest form (i.e., all fractions should be reduced).

$$(a) \frac{x^2 + 4x + 4}{3x} \cdot \frac{x^3}{2x + 4} \cdot \frac{12}{x^2 - 4}$$

$$(b) \frac{x - y}{5} \div \frac{x^2 - 2xy + y^2}{10}$$

$$(c) \frac{9z}{3z^2 + 6z + 3} - \frac{2z - 2}{z^2 - 1}$$

8. (4 pts each) Simplify the following complex fractions. You can leave common denominators in factored form (i.e., don't bother multiplying out denominators).

(a)
$$\frac{\frac{3}{2+x} - \frac{4}{2-x}}{\frac{1}{x+2} - \frac{3}{x-2}}$$

(b)
$$\frac{ab^{-2} - a^{-3}b}{ab^{-1} + a^{-2}b}$$

9. (5 pts) Compute $(2 + 5x^2 - 3x^4 + x) \div (x^2 - 2)$. Write your answer as quotient + remainder/divisor.

10. (4 pts) Compute $(3x^3 + 20x^2 + 2) \div (x + 7)$ using synthetic division. Write your answer as quotient + remainder/divisor. Also, if $P(x) = 3x^3 + 20x^2 + 2$, what is $P(-7)$?

11. (5 pts each) Solve each of the equations. State the solution set for each.

(a) $3 + \frac{x + 1}{x - 3} = 2 - \frac{5 - 3x}{x - 3}$

(b) $\frac{2}{x + 2} + \frac{x}{x - 3} + \frac{1}{x^2 - x - 6} = 0$

12. (10 pts) My ride to Seattle U is 8 miles long; on my ride home, I take the scenic route which is 10 miles long. My trip home is mostly downhill, so I average 3 mph faster than on my way to SU. If each direction takes the same time, how fast am I going on my ride home?