

Montgomery College
Department of Mathematics
Rockville Campus

MA091 ICL
PREPARATION AND REVIEW FOR EXAM 2
Fall 2008

Part 1: STUDY QUESTIONS

1. (Lesson 16) Which of the following expressions is *not* factorable?
 - (1) $x^2 + 25$
 - (2) $x^2 - 25$
 - (3) $x^2 + 10x + 25$
 - (4) $x^2 - 10x + 25$

- (a) Suppose a is any constant. In general, which of the following expressions are factorable? (Do the factoring.) Which *never* factors?
 - (1) $x^2 + a^2$
 - (2) $x^2 - a^2$
 - (3) $x^2 + 2ax + a^2$
 - (4) $x^2 - 2ax + a^2$

2. (Lesson 17) If a is any constant, and the expression $x^2 + ax - 12$ is factorable, what can you say about the signs in the factors?
If a is any constant, and the expression $x^2 + ax + 20$ is factorable, what can you say about the signs in the factors?

3. (Lesson 21) Consider the equations
 - (a) $9 = 2x^2 + 17x$
 - (b) $x^2 + 24 = 11x$
 - (c) $x^2 - 4x = 24 - 2x$What is the first step in each solution?

4. (Lesson 21) What's the best way to start solving $12x^2 + 20x - 8 = 0$?

5. (Lesson 22) In the expression $\frac{x-1}{x+4}$,
 - (a) could $x = 0$?
 - (b) Explain why we cannot have $x = -4$.

6. (Lesson 23) Which of the following fractions can **not** be reduced? Explain.

$$\frac{3}{6x-6}, \quad \frac{3x+5}{5x+3}, \quad \frac{x+1}{x^2-1}$$

Answers to Part I

- $x^2 + 25$ and $x^2 + a^2$ are not factorable. Note that the sum of squares $x^2 + 25$ is not factorable, while the sum of squares $4x^2 + 100$ has a common factor of 4 so its complete factorization is $4(x^2 + 25)$.
- The factors will contain opposite signs, i.e. $(x + _)(x - _)$
 (b) The factors will contain the same signs, $(x + _)(x + _)$ or $(x - _)(x - _)$
- Begin by collecting like terms and arranging the equation in the standard form $ax^2 + bx + c = 0$.
- Each coefficient is divisible by 4, so begin by dividing both sides of the equation by 4. This simplifies the factoring you need to do to complete the solution.
- (a) There is no difficulty if $x = 0$: the value of the fraction is then $-\frac{1}{4}$.
 (b) If $x = -4$, then the value of the expression in the denominator is 0, and division by zero is not defined.
- The fraction $\frac{3x+5}{5x+3}$ cannot be reduced. Neither numerator nor denominator is factorable, so there can be no division of common factors.

Part II: Practice Problems

- (Lesson 15) Remove the greatest monomial factor from each polynomial:
 (a) $3x^3 - 6x^2 + 12x$ (b) $8x^4 - 12x^3 - 4x^2$ (c) $a^3b^2 - 2a^3b + a^2b$
- (Lessons 16, 17) Factor each expression completely, if possible.
 (a) $x^2 - 8x + 16$ (b) $x^2 + 16$ (c) $x^2 - 6x - 16$
 (d) $x^2 - 16$ (e) $x^2 - 17x + 16$ (f) $x^2 + 10x + 16$
- (Lessons 18, 19) Factor each expression completely:
 (a) $2x^2 + 7x + 6$ (b) $2x^2 + 8x + 6$ (c) $2x^4 + 16x^2$
 (d) $4x^3 - 16x$ (e) $6x^2 - x - 12$ (f) $4x^2 + 4x - 15$
 (g) $4x^2 - 17x + 15$ (h) $4x^2 - 17x - 15$
- (Lesson 21) Solve each equation for x :
 (a) $x^2 = 5x + 24$ (b) $4x^2 + 20x + 25 = 0$ (c) $3x^2 = 7x$
 (d) $3x^2 - 13x + 4 = 0$ (e) $9x^2 = 64$ (f) $\frac{3}{4}x - \frac{1}{8} = 2$

5. (Lesson 22) State the value(s) of x for which the given expression is undefined:

(a) $\frac{x+1}{x+6}$ (b) $\frac{2x+3}{3x+7}$ (c) $\frac{x}{x^2-x-6}$

6. (Lesson 23) Reduce each fraction to its simplest form:

(a) $\frac{15x^2}{10x^6}$ (b) $\frac{6x+12}{3x+12}$ (c) $\frac{x-3}{x^2-x-6}$ (d) $\frac{4-x}{x^2-4x}$

7. (Lesson 24) Simplify the fractions, then multiply:

(a) $\frac{12x^2}{5y} \cdot \frac{y^2}{3x^5}$ (b) $\frac{x^2-2x}{x^2-1} \cdot \frac{x+1}{2x-4}$ (c) $\frac{x^2+9}{9x} \cdot \frac{3x^2+9x}{x^2-9}$

8. (Lesson 25) Divide the fractions as indicated. Your answer should be in simplest form.

(a) $\frac{3x^4}{2y^2} \div \frac{15x^5}{20y^5}$ (b) $\frac{x^2-1}{x^2-x-2} \div \frac{x^2+x-2}{x+2}$ (c) $\frac{x^2-4}{2x^2-4x} \div \frac{x^2+4}{4x^2}$

Answers

1. (a) $3x(x^2-2x+4)$ (b) $4x^2(2x^2-3x-1)$ (c) $a^2b(ab-2a+1)$

2. (a) $(x-4)^2$ (b) Not factorable (c) $(x-8)(x+2)$
(d) $(x+4)(x-4)$ (e) $(x-16)(x-1)$ (f) $(x+2)(x+8)$

3. (a) $(x+2)(2x+3)$ (b) $2(x+1)(x+3)$ (c) $2x^2(x^2+8)$
(d) $4x(x+2)(x-2)$ (e) $(2x-3)(3x+4)$ (f) $(2x-3)(2x+5)$
(g) $(x-3)(4x-5)$ (h) $(x-5)(4x+3)$

4. (a) $x=8, -3$ (b) $x=-\frac{5}{2}$ (c) $x=0, \frac{7}{3}$
(d) $x=4, \frac{1}{3}$ (e) $x=\frac{8}{3}, -\frac{8}{3}$ (f) $x=\frac{17}{6}$

5. (a) $x=-6$ (b) $x=-\frac{7}{3}$ (c) $x=3, -2$

6. (a) $\frac{3}{2x^4}$ (b) $\frac{2(x+2)}{x+4}$ (c) $\frac{1}{x+2}$
(d) $-\frac{1}{x}$

7. (a) $\frac{4y}{5x^3}$ (b) $\frac{x}{2(x-1)}$ (c) $\frac{x^2+9}{3(x-3)}$

8. (a) $\frac{2y^3}{x}$ (b) $\frac{1}{x-2}$ (c) $\frac{2x(x+2)}{x^2+4}$