

# Math 110 Review

1. Simplify each expression; your answers should have no negative exponents.

(a) $-3^{-2}$	(e) $\frac{3ab^{-1}}{(5ab^2)^{-1}}$	(h) $\frac{(3x^{-1}y^3)^{-2}}{(3xy^{-1})^3}(9x^{-9}y^5)$
(b) $(-3)^{-2}$	(f) $\left(\frac{3a^3b^{-2}}{2}\right)^{-3}$	(i) $10^{-6} \cdot 20^6$
(c) $\frac{2^{-3}r^{-5}t^{-2}}{2^5r^3t^4t^{-3}}$	(g) $(5^{4-3y})^3(5^{y-2})^2$	
(d) $\frac{(-2x^{-5}y)(-3xy^6)}{-6x^{-6}y^2}$		

2. Perform the indicated operations.

(a) $\left(\frac{2}{3}x^2 - \frac{1}{3}x + \frac{1}{6}\right) - \left(-\frac{1}{3}x^2 + x + 1\right)$	(g) $(4w^3 + 3y^2)(4w^3 - 3y^2)$
(b) $(a^2 + 2a + 3b)(a^2 - a - b)$	(h) $[3h + (k - 1)]^2$
(c) $(x^{2r} + y)(x^{4r} - x^{2r}y + y^2)$	(i) $(x + 1)^4$
(d) $(3t^2 - 4)(2t^2 + 3)$	(j) $25y\left(2y - \frac{1}{5}\right)^2$
(e) $(3 + 2x)(5 + x)$	(k) $(x^w - x^t)^2$
(f) $(x + 7)(y - w)$	

3. Factor each polynomial completely.

(a) $x^3 + 4x$	(i) $27x^2y - 64x^2y^4$
(b) $81 - y^2$	(j) $-2m^2n - 8mn - 8n$
(c) $a^2x^2 - b^2$	(k) $5y^2 - 14y - 3$
(d) $4x^2 + 20xy + 25y^2$	(l) $2w^2 - 21w - 11$
(e) $27x^3 - 1$	(m) $u^{6n} - 4u^{3n} + 4$
(f) $5a^4m - 45a^2m$	(n) $-2z^2 - 16z - 32$
(g) $2wt - 2wa + t - a$	(o) $x^{3m} + x^{2m} - 6x^m$
(h) $a^2x + 3a^2 - 4x - 12$	(p) $x^4 - 1$

4. Solve by factoring. State the solution set.

(a) $6p^2 + p = 1$	(d) $x + 5x = 6$
(b) $m^2 + \frac{11}{3}m = -2$	(e) $a^3 + 2a^2 - 16a - 32 = 0$
(c) $4x^2 - 12x + 9 = 0$	(f) $2x - 11x^2 = 6x^3$

5. State the domain of each rational expression, using both set notation and interval notation.

$$(a) \frac{5y - 1}{y^2 - 4} \qquad (c) \frac{x - 1}{x^2 + 16}$$

$$(b) \frac{x^2 - 3x - 4}{x^3 - 1} \qquad (d) \frac{z - 12}{3z}$$

6. Perform the indicated operations. Cancel common factors before multiplying; simplify before adding. All answers should be in lowest terms.

$$(a) \frac{x^2 + 6x + 9}{18} \div \frac{(x + 3)^2}{36}$$

$$(e) \frac{2x^2}{2x^3 - 18x} + \frac{15}{5x - 15}$$

$$(b) \frac{w^3 - 1}{(w - 1)^2} \cdot \frac{w^2 - 1}{w^2 + w + 1}$$

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

$$(c) \frac{x^2 + 5x + 6}{\left(\frac{x+2}{x+3}\right)}$$

$$(g) \frac{8a}{2a^2 + 4a + 2} - \frac{3a - 3}{a^2 - 1}$$

$$(d) \frac{x^2 + 5x + 6}{x} \cdot \frac{x^2}{3x + 6} \cdot \frac{9}{x^2 - 4}$$

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

7. Simplify each complex fraction.

$$(a) \frac{\frac{3}{2x} - \frac{4}{5x}}{\frac{1}{3} - \frac{2}{x}}$$

$$(c) \frac{\frac{a^2}{b^2} - \frac{b}{a^3}}{\frac{a^4}{b} + \frac{b^2}{a^2}}$$

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

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

8. Solve each equation.

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

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

$$(c) \frac{x + 2}{5} = \frac{3}{x}$$

$$(d) \frac{x}{x + 4} - \frac{2}{x + 1} = \frac{-2}{(x + 1)(x + 4)}$$

9. Word problems: do problems 111-114 on pp. 452-453 of the text.