

Complete as many of the following problems as you can. You do not have to go in order. You can use a calculator to check your work but not to solve the problems.

If **your entire table** finishes early, you may leave early.

- (1) Find the domain of the following rational functions. if the rational expression is defined for all real numbers, state this:

(a)  $\frac{13}{x+9}$

(c)  $\frac{y+1}{y^2-1}$

(b)  $\frac{x-3}{x^2+4x-45}$

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

- (2) Simplify the rational expressions.

(a)  $\frac{2x-12}{x^2-12x+36}$

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

(b)  $\frac{y^2+9y+8}{y^2+y-56}$

(d)  $\frac{x^2-14x+49}{x^2-49}$

(3) Perform the indicated operation:

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

$$(b) \frac{x^2 - 9x + 18}{x^2 - 5x - 6} \cdot \frac{x^2 - 1}{x^2 - 9}$$

$$(c) \frac{y^2 - 1}{y} \div \frac{y + 1}{y - 1}$$

$$(d) \frac{x^2 - 64}{8x - 8} \div \frac{x^2 + 16x + 64}{x^2 + 7x - 8}$$

(4) Perform the indicated operation:

(a)  $\frac{x^2 - 2x}{x^2 + 10x} + \frac{x^2 + x}{x^2 + 10x}$

(b)  $\frac{5}{x-2} + \frac{7}{x+3}$

(c)  $\frac{15}{x^2 + 10x + 25} + \frac{5}{x+5}$

(d)  $\frac{4x}{x^2 + 2x - 24} - \frac{3x}{x^2 + x - 20}$

Key:

- (1) (a)  $(-\infty, -9) \cup (-9, \infty)$   
(b)  $(-\infty, -9) \cup (-9, 5) \cup (5, \infty)$   
(c)  $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$   
(d)  $(-\infty, -4) \cup (-4, -1) \cup (-1, \infty)$

- (2) (a)  $\frac{2}{x-6}$ ,  $x \neq 6$   
(b)  $\frac{y+1}{y-7}$ ,  $y \neq -8, 7$   
(c)  $\frac{3}{x-3}$ ,  $x \neq 3$   
(d)  $\frac{x-7}{x+7}$ ,  $x \neq \pm 7$

- (3) (a)  $6$ ,  $x \neq \pm 3$

(b)  $\frac{x-1}{x+3}$ ,  $x \neq 6, -1, \pm 3$

(c)  $\frac{(y-1)^2}{y}$ ,  $y \neq 0, \pm 1$

(d)  $\frac{x-8}{8}$ ,  $x \neq 1, -8$

(4) (a)  $\frac{2x-1}{x+10}$ ,  $x \neq 0, -10$

(b)  $\frac{12x+1}{(x+3)(x-2)}$ ,  $x \neq 2, -3$

(c)  $\frac{5x+40}{(x+5)^2}$ ,  $x \neq -5$

(d)  $\frac{x^2+2x}{(x+6)(x-4)(x+5)}$ ,  $x \neq -6, 4, -5$