4. What is the domain for the following function?

$$y = \frac{4}{x^2} + 1$$

A. $(x \neq 3)$

B. $(x \neq 0)$

C. (all real numbers)

D. $(x \neq -3)$

Solution

The function is defined for values of x, not equal to zero, because it is impossible to divide by zero. The domain will be the following:

$$x^2 \neq 0$$

$$x \neq 0$$

Answer: B. $(x \neq 0)$

5. What is the range for the following function?

$$y = \frac{1}{x + 3} + 2$$

A. $\{y: y \in R, y \neq 2\}$

B. $\{y: y \in R, y \neq 3\}$

C. $\{y: y \in R\}$

D. $\{y: y \in R, y \neq -2\}$

Solution

To get the range for the function, solve the equation for A:

$$\frac{1}{x + 3} + 2 = A, \qquad A \in E(y)$$

$$\frac{1}{x + 3} + 2 = A$$

$$\frac{1}{x + 3} = A - 2$$

$$(x + 3)(A - 2) = 1$$

$$Ax - 2x + 3A - 6 - 1 = 0$$

$$x(A - 2) + 3A - 7 = 0$$
$$x(A - 2) = 7 - 3A$$
$$x = \frac{7 - 3A}{A - 2}$$
$$A - 2 \neq 0$$
$$A \neq 2$$

Answer: A. $\{y: y \in R, y \neq 2\}$

7. Which function does not have a vertical asymptote?

A. $y = 5x - \frac{1}{x}$

B. $y = \frac{x}{1} + x^2$

C. $y = \frac{5x}{1} - x^2$

D. $y = \frac{5x}{x} + x^2$

Solution

For $y = 5x - \frac{1}{x}$, the domain is $D(x) = (-\infty; 0) \cup (0; +\infty)$;

a vertical asymptote: $x = 0$.

For $y = \frac{x}{1} + x^2 = x + x^2$, the domain is $D(x) = \mathbb{R}$;

a vertical asymptote: none.

For $y = \frac{5x}{1} - x^2 = 5x - x^2$, the domain is $D(x) = \mathbb{R}$;

a vertical asymptote: none.

For $y = \frac{5x}{x} + x^2$, the domain is $D(x) = (-\infty; 0) \cup (0; +\infty)$;

a vertical asymptote: $x = 0$.

Answer: B. $y = \frac{x}{1} + x^2$

C. $y = \frac{5x}{1} - x^2$