

BB

**NO CALCULATORS**

[1] State the domain of each function.

[a]  $f(x) = \frac{x-4}{x+3}$

$\mathbb{R} - \{-3\}$

[b]  $f(x) = \frac{x^2-25}{x^2-9}$

$\mathbb{R} - \{\pm 3\}$

[c]  $f(x) = \frac{x+1}{x^2-2x-3} = \frac{x+1}{(x-3)(x+1)}$

$\mathbb{R} - \{-1, 3\}$

[d]  $f(x) = \frac{x+1}{x^3-2x^2-4x+8} = \frac{x+1}{x^2(x-2)-4(x-2)(x+2)}$

$\mathbb{R} - \{\pm 2\}$

[2] For each function, state the x-intercept(s).

[a]  $f(x) = \frac{x^2-9}{x+5} = \frac{(x-3)(x+3)}{x+5}$

$\pm 3$

[b]  $f(x) = \frac{x^2-6x+8}{x^2-4} = \frac{(x-2)(x-4)}{(x-2)(x+2)}$

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[3] For each function, state the vertical asymptote(s).

[a]  $f(x) = \frac{x+2}{x-6}$

$x=6$

[b]  $f(x) = \frac{x}{x^2-x} = \frac{1}{x(x-1)}$

$x=1$

[c]  $f(x) = \frac{x+4}{x^2-2x-15} = \frac{x+4}{(x+3)(x-5)}$

$x=-3, x=5$

[d]  $f(x) = \frac{x^2-4}{x^2-25} = \frac{(x+2)(x-2)}{(x+5)(x-5)}$

$x=\pm 5$

[4] For each function, state the y-intercept.

[a]  $f(x) = \frac{x-3}{x-5}$

$\boxed{\frac{3}{5}}$

[b]  $f(x) = \frac{x^2-4}{x^3+2x^2-x-2}$

$\boxed{2}$

[5] For each function, state the non-vertical asymptote.

[a]  $f(x) = \frac{x}{x^2+1}$

$\boxed{y=0}$

[b]  $f(x) = \frac{x^2-2x+2}{x^3+1}$

$\boxed{y=0}$

[c]  $f(x) = \frac{2x^2-3}{3x^2-6}$

$\boxed{y = \frac{2}{3}}$

[d]  $f(x) = \frac{2x^2+2x+4}{x^2+3x+1}$

$\boxed{y=2}$

[6] Find the non-vertical asymptote using division  $f(x) = \frac{x^2+2}{x+1}$

$$\begin{array}{r} x-1 \\ x+1 \overline{) x^2 \phantom{+2} } \\ \underline{-x^2 - x} \phantom{+2} \\ -x + 2 \end{array}$$

$\boxed{y = x-1}$

[7] For each function, state the ordered pair of the removable discontinuity (the "hole").

[a]  $f(x) = \frac{x-2}{x^2-4} = \frac{x-2}{\cancel{(x-2)}(x+2)}, x=2$

$\boxed{(2, \frac{1}{4})}$

[b]  $f(x) = \frac{x^2+3x+2}{x^2-x-6} = \frac{\cancel{(x+2)}(x+1)}{\cancel{(x+2)}(x-3)}$

$\boxed{(-2, \frac{1}{5})}$

$\frac{-2+1}{-2-3}$

