

Find all asymptotes (VA, HA, SA) for the graphs of these rational functions.

1.  $y = \frac{(x-1)(x+3)}{x(x-1)}$  VA:  $x=0$  ; HA:  $y=1$  ; no SA

2.  $y = \frac{x(x-1)(x+3)}{(x-5)(x+2)}$  VA:  $x=-2$  ,  $x=5$  ; no HA ; SA:  $y=x+1$

3.  $y = \frac{3x(x-2)}{(x-4)(5x+2)}$  VA:  $x=4$  ,  $x=\frac{-2}{5}$  ; HA:  $y=\frac{3}{5}$  ; no SA

4.  $y = \frac{(x-8)(x+4)}{(2x-1)(x-3)(x+1)}$  VA:  $x=\frac{1}{2}$  ,  $x=-1$  ,  $x=3$  ; HA:  $y=0$  ; no SA

5.  $y = \frac{4(x-2)(x+9)}{(-2x+3)(x-1)}$  VA:  $x=\frac{3}{2}$  ,  $x=1$  ; HA:  $y=-2$  ; no SA

6.  $y = \frac{x(x-2)(x+3)}{(2x-5)}$  VA:  $x=\frac{5}{2}$  ; no HA ; SA:  $y=x^2+\frac{7}{2}x+\frac{11}{4}$

7.  $y = \frac{4x^2+3}{x^2+9}$  no VA ; HA:  $y=4$  ; no SA

8.  $y = \frac{x^3-x^2-12x}{2(x^2-5x-14)}$  VA:  $x=0$  ,  $x=1$  ; HA:  $y=1$  ; no SA

9.  $y = \frac{x^2-3x}{5x^2-1}$  VA:  $x=\frac{1}{\sqrt{5}}$  ,  $x=\frac{-1}{\sqrt{5}}$  ; HA:  $y=\frac{1}{5}$  ; no SA

10.  $y = \frac{x(x+2)(x-5)(2x+7)}{(x+5)^2(3x+1)^2}$  VA:  $x=-5$  ,  $x=\frac{-1}{3}$  ; HA:  $y=\frac{2}{9}$  ; no SA