


MORE Rational Functions Practice

Remember to show work with Algebra for credit! ©

For each problem find the following (if any exist). Remember to give coordinate pairs for holes, x-intercept(s) and y-intercept.

a) Find holes, vertical asymptotes, and horizontal asymptotes.

b) Find domain, x-intercept(s), and y-intercept.

9. $f(x) = \frac{3x^2}{(x-4)(x+4)} = \frac{3x^2}{x^2-16}$
 Hole: none V.A.: $x = -4, x = 4$ H.A.: $y = 3$ Same degree → ratio
 Domain: $(-\infty, -4) \cup (-4, 4) \cup (4, \infty)$ x-int(s): $(0, 0)$ y-int: $(0, 0)$
Fix make x^2-16


10. $f(x) = \frac{x^2+x-6}{x+3} = \frac{(x+3)(x-2)}{x+3}$
 Hole: $(-3, -5)$ V.A.: none H.A.: none large degree / small degree
 Domain: $(-\infty, -3) \cup (-3, \infty)$ x-int(s): $(2, 0)$ y-int: $(0, -2)$
 $y = x - 2$ Hole $(-3, -5)$
 $y = -3 - 2 = -5$
 $0 = x - 2$

11. $f(x) = \frac{x+8}{x^2-64} = \frac{x+8}{(x+8)(x-8)}$
 Hole: $(-8, \frac{1}{16})$ V.A.: $x = 8$ H.A.: $y = 0$ Small degree / large degree
 Domain: $(-\infty, -8) \cup (-8, 8) \cup (8, \infty)$ x-int(s): none y-int: $(0, -\frac{1}{8})$
 $y = \frac{1}{x-8}$ Hole $(-8, \frac{1}{16})$
 $y = \frac{1}{-8-8} = -\frac{1}{16}$
 $0 = \frac{1}{x-8} \rightarrow 0 = 1$ what?

12. $f(x) = \frac{x+8}{x^2+64}$
 Hole: none V.A.: none H.A.: $y = 0$ Small degree / large degree
 Domain: $(-\infty, \infty)$ x-int(s): $(-8, 0)$ y-int: $(0, \frac{1}{8})$
 denom $\neq 0 \rightarrow x^2+64 \neq 0$
 $x^2 \neq -64$ gives $\sqrt{-64}$ so NO domain restriction
 $0 = \frac{x+8}{x^2+64} \rightarrow 0 = x+8$

13. $f(x) = \frac{x^3-8}{x-4} = \frac{(x-2)(x^2+2x+4)}{x-4}$
 Hole: $(2, 12)$ V.A.: none H.A.: none large degree / small degree
 Domain: $(-\infty, 2) \cup (2, \infty)$ x-int(s): none y-int: $(0, 4)$
 $y = x^2+2x+4$ Hole $(2, 12)$
 $y = 2^2+2(2)+4 = 12$
 $0 = x^2+2x+4$ Imag solutions

14. $f(x) = \frac{x^2+4x+3}{3x^2+6x+3} = \frac{(x+3)(x+1)}{3(x+1)(x+1)}$
 Hole: none V.A.: $x = -1$ H.A.: $y = \frac{1}{3}$ same degree → ratio
 Domain: $(-\infty, -1) \cup (-1, \infty)$ x-int(s): $(-3, 0)$ y-int: $(0, 1)$
 $y = \frac{x+3}{3(x+1)}$ Hole: $(-1, \frac{1}{3})$ none
 $y = \frac{-1+3}{3(-1+1)} \rightarrow \frac{2}{0}$ so NO Hole!
 $0 = \frac{x+3}{3(x+1)} \rightarrow 0 = x+3$
 $y = \frac{0+3}{3(0+1)} = 1$

15. $f(x) = \frac{x^3-1}{x^2-1} = \frac{(x-1)(x^2+x+1)}{(x-1)(x+1)}$
 Hole: $(1, 3)$ V.A.: $x = -1$ H.A.: none large degree / small degree
 Domain: $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$ x-int(s): none y-int: $(0, 1)$
 $0 = \frac{x^2+x+1}{x+1}$
 $0 = x^2+x+1 \rightarrow$ imag. soln.