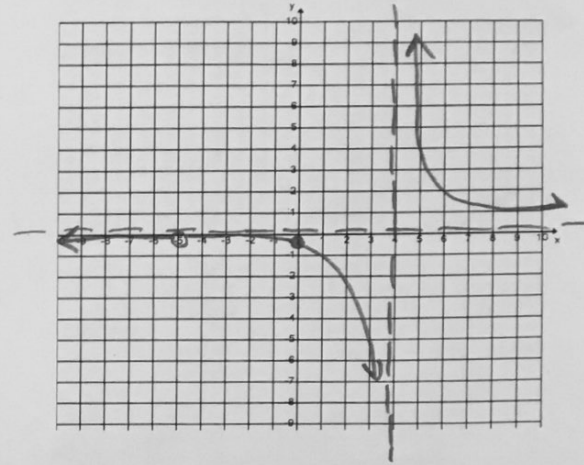


Graph each function. Intercepts and holes must be written as coordinate points ex(11, 0) . Asymptotes must be written as lines (ex. x = 12 or y = -13)

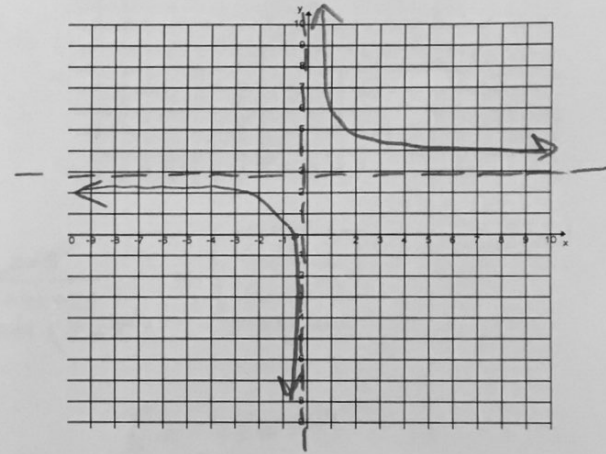
1. $f(x) = \frac{x+5}{x^2+x-20} = \frac{x+5}{(x+5)(x-4)}$

- Holes $(-5, -1/4)$
- y intercept(s) $(0, -1/4)$
- x-intercept(s) none
- Vertical asymptote(s) $x = 4$
- Horizontal asymptote(s) $y = 0$



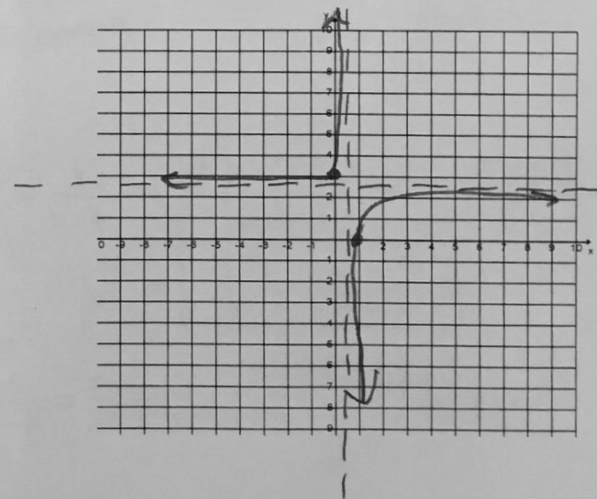
2. $f(x) = \frac{1}{5x} + 3 = \frac{1}{5x} + \frac{15x}{5x} = \frac{1+15x}{5x}$

- Holes None
- y intercept(s) None
- x-intercept(s) $(-1/15, 0)$
- Vertical asymptote(s) $x = 0$
- Horizontal asymptote(s) $y = 3$

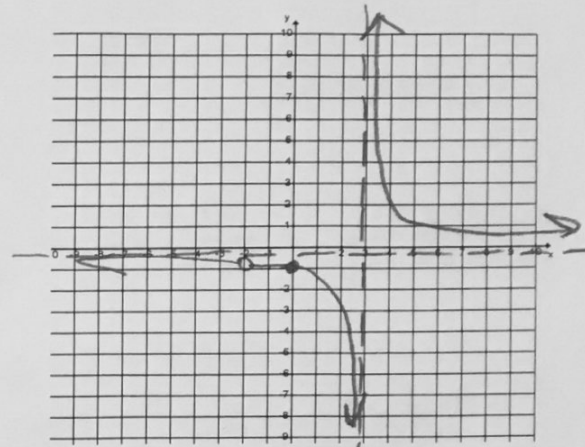


3. $f(x) = \frac{5x-3}{2x-1}$

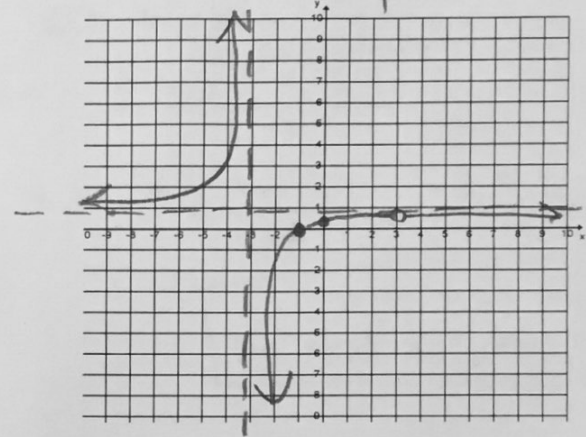
- Holes None
- y intercept(s) $(0, 3)$
- x-intercept(s) $(3/5, 0)$
- Vertical asymptote(s) $x = 1/2$
- Horizontal asymptote(s) $y = 5/2$



4. $f(x) = \frac{x+2}{x^2-x-6} = \frac{x+2}{(x-3)(x+2)}$
- Holes $(-2, -1/5)$
 - y intercept(s) $(0, -1/3)$
 - x-intercept(s) none
 - Vertical asymptote(s) $x = 3$
 - Horizontal asymptote(s) $y = 0$



5. $f(x) = \frac{x^2-2x-3}{x^2-9} = \frac{(x-3)(x+1)}{(x+3)(x-3)}$
- Holes $(3, 2/3)$
 - y intercept(s) $(0, 1/3)$
 - x-intercept(s) $(-1, 0)$
 - Vertical asymptote(s) $x = -3$
 - Horizontal asymptote(s) $y = 1$



Simplify

6. $\frac{14x^7y^{11}}{22ab^4} \times \frac{15a^3b^8}{20xy^4} = \frac{21a^4x^6y^7}{44b}$

7. $\frac{(x+4)(x-3)}{x^2-9} \times \frac{x+3}{x^2+9x+20} = \frac{1}{x+5}$

Divide and Simplify

8. $\frac{20x^5y^7}{9ab^8} \div \frac{15x^{11}y^5}{8ab^{13}} = \frac{32b^5y^2}{27x^6}$

9. $\frac{b+3}{b^2+6b+9} \div \frac{b+2}{b^2-9} = \frac{b-3}{b+2}$

Add or Subtract and Simplify

10. $\frac{11}{x^2-25} - \frac{8}{x+5} = \frac{-8x+51}{(x-5)(x+5)}$

11. $\frac{x^2+x+12}{x^2-3x-4} - \frac{3}{x-4} = \frac{x^2-2x+9}{(x-4)(x+1)}$

Solve each equation. Remember to check for extraneous solutions.

12. $\frac{2}{x-6} = \frac{4}{3x-10}$

13. $\frac{2}{x+3} - \frac{x}{x-3} = \frac{x+11}{x^2-9}$

See next page

14. $\frac{1}{3} - \frac{4x}{x^2} = \frac{-9}{x^2}$

15. $\frac{2}{x+5} - \frac{4}{x-5} = \frac{1}{x^2-25}$

12

$$\frac{2}{x-6} = \frac{4}{3x-10}$$

$$2(3x-10) = 4(x-6)$$

$$6x - 20 = 4x - 24$$

$$2x = -4$$

$$x = -2$$

13

$$\frac{2}{x+3} - \frac{x}{x-3} = \frac{x+11}{x^2-9}$$

$$(x+3)(x-3)$$

$$\frac{2x-6}{(x+3)(x-3)} - \frac{x^2+3x}{(x+3)(x-3)} = \frac{x+11}{(x+3)(x-3)}$$

$$2x-6 - (x^2+3x) = x+11$$

$$2x-6 - x^2 - 3x = x+11$$

$$0 = x^2 + 2x + 17$$

$$x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(17)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{-64}}{2} = \frac{-2 \pm 8i}{2}$$

$$x = -1 \pm 4i$$

No real solution

14

$$\frac{1}{3} - \frac{4x}{x^2} = -\frac{9}{x^2}$$

$$\frac{x^2}{3x^2} - \frac{12x}{3x^2} = \frac{-27}{3x^2}$$

$$x^2 - 12x = -27$$

$$x^2 - 12x + 27 = 0$$

$$(x-9)(x-3) = 0$$

$$x=9 \quad x=3$$

15

$$\frac{2}{x+5} - \frac{4}{x-5} = \frac{1}{x^2-25}$$

$$(x-5)(x+5)$$

$$\frac{2x-10}{(x-5)(x+5)} - \frac{4x+20}{(x-5)(x+5)} = \frac{1}{(x-5)(x+5)}$$

$$2x-10 - 4x - 20 = 1$$

$$-2x = 31$$

$$x = -31/2$$