

Practise, Apply, Solve 4.6, page 345

- Is inverse variation; x increases as y decreases; xy remains 48.
 - Is inverse variation; x decreases as y increases; xy remains 3600.
 - Not inverse variation; x and y both increase; xy does not remain constant.
- $y = \frac{48}{x}$
 - $y = \frac{3600}{x}$
 - $y = x^2$
- $y = \frac{1}{2x}, x = 0$
 - $y = \frac{1}{x+5}, x = -5$
 - $y = \frac{1}{x-4}, x = 4$
 - $y = \frac{1}{2x+5}, x = -\frac{5}{2}$
 - $y = \frac{1}{-3x+6}, x = 2$
 - $y = \frac{1}{(x-3)^2}, x = 3$
 - $y = \frac{1}{x^2-3x-10}, x = -2, x = 5$
 - $y = \frac{1}{3x^2-4x-4}, x = -\frac{2}{3}, x = 2$
- $f^{-1}(x): \frac{1}{16}, \frac{1}{14}, \frac{1}{12}, \frac{1}{10}, \frac{1}{8}, \frac{1}{6}, \frac{1}{4}, \frac{1}{2}$, undefined, $-\frac{1}{2}, -\frac{1}{4}, -\frac{1}{6}$; $f(x)$: line, x -intercept -4 ; y -intercept 8 ; $f(x)$: hyperbola, vertical asymptote $x = 4$; horizontal asymptote $y = 0$
 - $y = -2x + 8, y = \frac{1}{-2x + 8}$
- $\frac{1}{y} = \frac{1}{-x-1}$
 - $\frac{1}{y} = \frac{1}{\frac{3}{2}x-2}$ and $\frac{1}{y} = -\frac{1}{\frac{3}{2}x-2}$
 - $\frac{1}{y} = \frac{1}{36-x^2}$
 - $\frac{1}{y} = \frac{1}{2}, -6 \leq x \leq -2, \frac{1}{y} = \frac{1}{-2x-2}, -2 \leq x \leq -1, \frac{1}{y} = \frac{1}{2x+2}, -1 \leq x \leq 1$
- when $x = 4, y = 78.75$, not $y = 87.5; y = \frac{315}{x}$
- 5 s, $a = \frac{60}{t}$
- 0.545 A
 - 1650 W
 - $\frac{I}{W} = \text{constant} = \frac{1}{V}$
- $f(x) = x + 2$: line, x -intercept: -2 , y -intercept: 2 ;
 $f(x) = \frac{1}{x+2}$: hyperbola, vertical asymptote $x = -2$, horizontal asymptote $y = 0$
 - $D = \{x | x \neq -2, x \in \mathbf{R}\}, R = \{y | y \neq 0, y \in \mathbf{R}\}$;
 $f^{-1}(x) = \frac{1}{x} + 2$
- $y = x - 1$: line, x -intercept: 1 , y -intercept: -1 ; $y = \frac{1}{x-1}$: hyperbola, vertical asymptote $x = 1$; horizontal asymptote $y = 0$;
 $f(x) = \frac{1}{x-1}$ has $D = \{x | x \neq 1, x \in \mathbf{R}\}$,
 $R = \{y | y \neq 0, y \in \mathbf{R}\}; f^{-1}(x) = 1 + \frac{1}{x}$
 - $y = 5 - x$: line, x -intercept: 5 , y -intercept: 5 ; $y = \frac{1}{5-x}$: hyperbola, vertical asymptote $x = 5$; horizontal asymptote $y = 0$;
 $f(x) = \frac{1}{5-x}$ has $D = \{x | x \neq 5, x \in \mathbf{R}\}$,
 $R = \{y | y \neq 0, y \in \mathbf{R}\}; f^{-1}(x) = 5 - \frac{1}{x}$
- $y = 2x - 5$: line, x -intercept: 2.5 , y -intercept: -5 ;
 $y = \frac{1}{2x-5}$: hyperbola, vertical asymptote $x = 2.5$, horizontal asymptote $y = 0$; $f(x) = \frac{1}{2x-5}$ has
 $D = \{x | x \neq \frac{5}{2}, x \in \mathbf{R}\}, R = \{y | y \neq 0, y \in \mathbf{R}\}$
 - $y = 3x + 4$: line, x -intercept $-\frac{4}{3}$, y -intercept 4 ; $y = \frac{1}{3x+4}$: hyperbola, vertical asymptote $x = -\frac{4}{3}$, horizontal asymptote

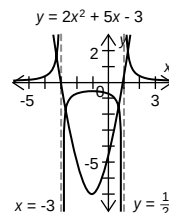
$$y = 0; f(x) = \frac{1}{3x+4} \text{ has } D = \{x | x \neq -\frac{4}{3}, x \in \mathbf{R}\},$$

$$R = \{y | y \neq 0, y \in \mathbf{R}\}$$

- $y = -x$: line, x -intercept 0 , y -intercept 0 ; $y = \frac{1}{-x}$ hyperbola; vertical asymptote $x = 0$, horizontal asymptote $y = 0$;

$$f(x) = \frac{1}{-x} \text{ has } D = \{x | x \neq 0, x \in \mathbf{R}\}, R = \{y | y \neq 0, y \in \mathbf{R}\}$$

12.



- $y = \frac{1}{x^2-4}$
 - $y = \frac{1}{(x-2)^2-3}$
 - $y = \frac{1}{x^2-3x+4}$
 - $y = \frac{1}{(x+3)^2}$
 - $y = \frac{1}{x^2+2}$
 - $y = \frac{1}{-(x+4)^2+1}$
- The graph of $y = \frac{1}{x^2-3x-10}$ will pass through points $(x, 1)$ and $(x, -1)$ from $y = x^2 - 3x - 10$.
- $\frac{1}{f(x)} = \frac{1}{2x+1}, f^{-1}(x) = \pm\sqrt{x+1}$
domain of $f = \mathbf{R}$, range of $f = \mathbf{R}$; domain of $\frac{1}{f} = \{x | x \neq -\frac{1}{2}, x \in \mathbf{R}\}$, range of $\frac{1}{f} = \{y | y \neq 0, y \in \mathbf{R}\}$;
domain of $f^{-1} = \mathbf{R}$, range of $f^{-1} = \mathbf{R}$
 - $\frac{1}{f(x)} = \frac{1}{x^2-1}, f^{-1}(x) = \pm\sqrt{\frac{1}{x}+1}$
domain of $f = \mathbf{R}$, range of $f = \{y | y \geq 1, y \in \mathbf{R}\}$;
domain of $\frac{1}{f} = \{x | x \neq \pm 1, x \in \mathbf{R}\}$, range of $\frac{1}{f} = \{y | y > 0 \text{ or } y < -1, y \in \mathbf{R}\}$; domain of $f^{-1} = \{x | x \geq -1, x \in \mathbf{R}\}$, range of $f^{-1} = \mathbf{R}$
 - $\frac{1}{f(x)} = \frac{1}{\sqrt{x-4}-3}, f^{-1}(x) = (x+3)^2 + 4$
domain of $f = \{x | x \geq 4, x \in \mathbf{R}\}$, range of $f = \{y | y \geq -3, y \in \mathbf{R}\}$; domain of $\frac{1}{f} = \{x | x \geq 4, x \neq 13, x \in \mathbf{R}\}$, range of $\frac{1}{f} = \{y | y \neq 0, y \in \mathbf{R}\}$; domain of $f^{-1} = \mathbf{R}$, range of $f^{-1} = \{y | y \geq 4, y \in \mathbf{R}\}$
- Answers may vary. Key point: $f(x) = \frac{1}{x}$ is the reciprocal of $f(x) = x$.
- $\left(x, \frac{1}{x}\right) = (1, 1), (2, 0.5), (4, 0.25), (7, 0.14), (10, 0.10)$
 - $\left(\frac{1}{x}, y\right) = (1, 5.5), (0.5, 4), (0.25, 3.3), (0.14, 2.9), (0.10, 2.8)$
 - $k = 3, b = 2.5, y = 3\left(\frac{1}{x}\right) + 2.5$
- $(x, A(x)) = (1, 0), (2, 0.69), (3, 1.1), (4, 1.38), (5, 1.61), (6, 1.79), (7, 1.94), (8, 2.08), (9, 2.20), (10, 2.30), (11, 2.40), (12, 2.48)$
 - $A(3) + A(4) = A(12)$
 - $A(10) - A(2) = A(5)$
 - $A(9) = A(3) + A(3)$
 - 2.89
 - 3.22
 - 0.92
 - 1.51
- $y = \frac{1}{x+4} - 1$