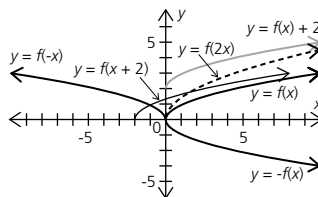


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- $D = \{1, 2, 3, 4\}$, $R = \{3, 5, 7, 9\}$
 - $1 \rightarrow 9, 2 \rightarrow 7, 3 \rightarrow 5, 4 \rightarrow 3$
 - $y = -2x + 11$, $\{x \mid x \leq 4, x \in \mathbf{N}\}$
 - $x \rightarrow -2x + 11$, $\{x \mid x \leq 4, x \in \mathbf{N}\}$;
 $f(x) = -2x + 11$, $\{x \mid x \leq 4, x \in \mathbf{N}\}$
 - function: each domain element corresponds to a unique range element; passes vertical line test
 - Example: $(1, 1)$
- $D = \{-3, -2, -1, 0, 1, 2\}$ or $\{x \mid -3 \leq x \leq 2, x \in \mathbf{I}\}$,
 $R = \{-1, 0, 1, 2, 3, 4, 5\}$ or $\{y \mid -1 \leq y \leq 5, y \in \mathbf{I}\}$, not a function: -2 maps onto 2 and 5
 - $D = \{x \mid -3 \leq x \leq 4, x \in \mathbf{R}\}$, $R = \{y \mid -1 \leq y \leq 5, y \in \mathbf{R}\}$, not a function: 0 maps onto 5 and -1
 - $D = \mathbf{R}$, $R = \{y \mid y \geq -1, y \in \mathbf{R}\}$, function: passes vertical line test
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 - parabola opening upward with vertex $(1.5, -4.5)$ through $(0, 0)$ and $(3, 0)$
 - function: passes vertical line test
 - $f(5) = 20$ (e) $x = 0$ or $x = 3$
- top half of parabola opening to left with vertex $(9, 0)$ through $(0, 3)$
 - $D = \{s \mid s \leq 9, s \in \mathbf{R}\}$, $R = \{y \mid y \geq 0, y \in \mathbf{R}\}$
- independent variable: weekly sales; dependent variable: weekly earnings. It should be a function because the same value for her sales should produce the same total earnings. It is important that the employee's pay be reliable and predictable.
 - Example: $D = \{x \mid 0 \leq x \leq 20\,000, x \in \mathbf{R}\}$ and
 $R = \{y \mid 85 \leq y \leq 1035, y \in \mathbf{R}\}$
 - 285
 - horizontal line from $(0, 85)$ to $(1000, 85)$, then upward to right through $(5000, 285)$
- solid line between open dot at -2 and open dot at 4
 - closed dots at $1, 2$, and 3
 - solid line to left of open dot at -1 , solid line to right of open dot at 1
- $\{x \in \mathbf{I} \mid x \geq -2, x \in \mathbf{I}\}$ (b) $\{x \mid -5 < x \leq 3, x \in \mathbf{R}\}$
- $D = \{x \mid x < -3, x \in \mathbf{R}\}$ (b) $R = \{y \mid 0 < y \leq 4, y \in \mathbf{R}\}$
- parabola opening downward with vertex $(-1, 4)$ through $(-4, -5)$ and $(2, -5)$.
 - $D = \{x \mid -3 \leq x \leq 1, x \in \mathbf{R}\}$
- $D = \{-5, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$;
 $R = \{-1, 0, 1, 2, 3, 4, 5\}$
 - $f^{-1} = \{(-1, 0), (0, -1), (0, 1), (1, 2), (2, -2), (3, -3), (3, 3), (4, -5), (5, 4)\}$
 - 0 (e) 2 (f) ± 1 (g) undefined
- connected points $(1, 6)$ to $(1, 3)$ to $(-2, 2)$ to $(-2, -1)$ to $(3, -4)$
- $f^{-1}(x) = 2x - 3$
- $g(s) = 100 + 11.5s$, $s \in \mathbf{W}$
 - $g^{-1}(x) = \frac{x - 100}{11.5}$, $g^{-1}(x) \in \mathbf{W}$
 - Subtract \$100 from total charge, then divide by \$11.50.
 - $D = \{x \mid x = 100 + 11.5s, s \in \mathbf{W}\}$
 - Example: A school council ordered shirts from a printing company and received a bill for \$1000 (excluding tax). If the company charges \$100 plus \$11.50/shirt, determine the number of shirts ordered.

- $y = x^2$ defines a parabola that opens up and has vertex at $(0, 0)$.
 $y = \sqrt{x}$ defines the upper branch of a parabola that opens to the right and has vertex at $(0, 0)$. The inverse of $y = x^2$ is a parabola that contains the branch defined by $y = \sqrt{x}$ and the branch defined by $y = -\sqrt{x}$. The inverse of $y = \sqrt{x}$ is the right branch of the parabola defined by $y = x^2$. When $y = x^2$ is reflected in $y = x$, the result is the parabola that contains the branch defined by $y = \sqrt{x}$. When $y = \sqrt{x}$ is reflected in $y = x$, the result is the right branch of the parabola defined by $y = x^2$.
- Example: $f^{-1} = \{(-1, 0), (0, 1), (1, 2), (2, -2), (3, 3), (4, -5), (5, 5)\}$
- (a) g : parabola opening upward with vertex $(3, 1)$ through $(2, 5)$ and $(4, 5)$; g^{-1} : parabola opening to right with vertex $(1, 3)$ through $(5, 4)$ and $(5, 2)$
 - about $(2.2, 3.55)$, $(2.4, 2.4)$, $(3.55, 2.2)$, and $(3.84, 3.84)$
 - $x = 4(y - 3)^2 + 1$ (d) g^{-1} is $y = 3 \pm \sqrt{\frac{x-1}{4}}$
 - $x \geq 3$ (or $x \leq 3$) (f) no: $g^{-1}(5) = 2$ and $g^{-1}(5) = 4$
- (a) f : top half of parabola opening to left with vertex $(1.5, 0)$,
 f^{-1} : parabola opening downward with vertex $(0, 1.5)$ through $(-3, -3)$ and $(3, -3)$
 - $x = \sqrt{3 - 2y}$ (c) f^{-1} is $y = \frac{3 - x^2}{2}$

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- 28 (b) 22 (c) undefined
 - $g = \{(1, 22), (0, 19), (-1, 28), (-2, 49)\}$
- $$x \rightarrow \boxed{+2} \rightarrow \boxed{\times 3} \rightarrow \boxed{f} \rightarrow \boxed{\times \frac{1}{2}} \rightarrow \boxed{-4} \rightarrow y$$
 - vertical stretch by factor of $\frac{1}{2}$, horizontal stretch by factor of $\frac{1}{3}$, 2 units left, 4 units down
 - $D = \{x \mid -\frac{4}{3} \leq x \leq -\frac{1}{3}, x \in \mathbf{R}\}$, $R = \{y \mid y \geq -5, y \in \mathbf{R}\}$
- $$x \leftarrow \boxed{+6} \leftarrow \boxed{\times 2} \leftarrow \boxed{g} \leftarrow \boxed{\times (-1)} \leftarrow \boxed{+1} \rightarrow y$$

horizontal translation right 6

horizontal stretch factor 2

vertical stretch factor -1

vertical translation up 1
 - $D = \{x \mid -2 \leq x \leq 18, x \in \mathbf{R}\}$, $R = \{y \mid -2 \leq y \leq 3, y \in \mathbf{R}\}$
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