

Unit 2 Review

Functions

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Topics:

- Introduction to Functions
- Solving Inequalities
- Radical Notation
- Operations with Radicals
- Domain and Range
- Function Notation
- Transformations
- Sketching

Nelson Page 206 #s 1 - 4, 16 - 19, 22 & 25

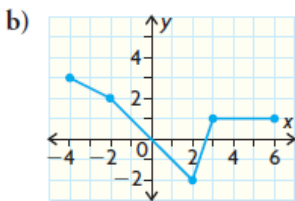
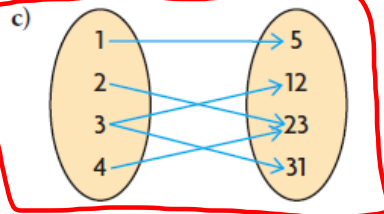
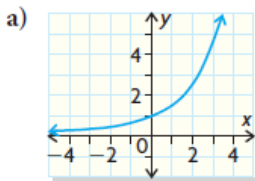


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Solutions

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1. Identify the relation that is not a function.



d) $\{(8, 9), (3, 2), (5, 7), (1, 0), (4, 6)\}$

To be a function:
pass the VLT (vertical line test)

every x -value has only one y -value.

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2. For the graph of $f(x) = \sqrt{x}$, identify the transformation that would *not* be applied to $f(x)$ to obtain the graph of $y = 2f(-2x) + 3$.

- a) vertical stretch by factor of 2
 b) reflection in x -axis
 c) vertical translation up 3 units
 d) horizontal compression by factor of $\frac{1}{2}$

$$f(x) = a f(k(x-d)) + c$$

VS/VC HS/HC VT
 ($1/k$) HT

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3. An American visitor to Canada uses this function to convert from temperature in degrees Celsius into degrees Fahrenheit: $f(x) = 2x + 30$. Identify $f^{-1}(x)$.

- a) $f^{-1}(x) = \frac{x+30}{2}$ c) $f^{-1}(x) = \frac{x-2}{30}$
 b) $f^{-1}(x) = \frac{x-30}{2}$ d) $f^{-1}(x) = \frac{x+2}{30}$

$$f^{-1}(x) = \text{inverse}$$

$$[f(x)]^{-1} = \text{reciprocal}$$

Find the inverse

$$y = 2x + 30$$

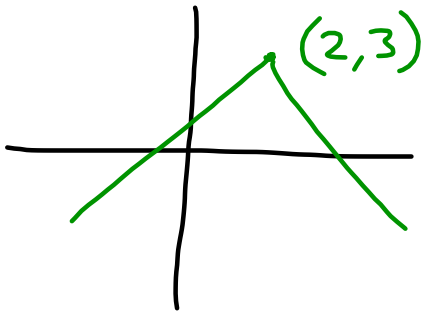
$$x = 2y + 30$$

$$\frac{x-30}{2} = \frac{2y}{2} \Rightarrow f^{-1}(x) = \frac{x-30}{2}$$

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4. The range of $f(x) = -|x - 2| + 3$ is

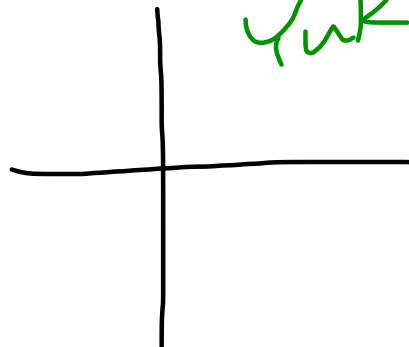
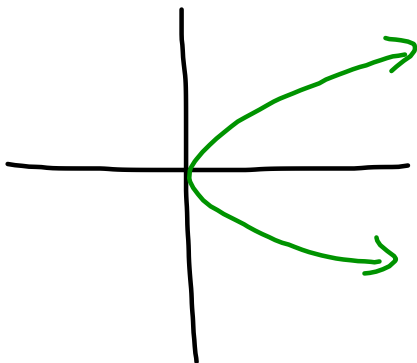
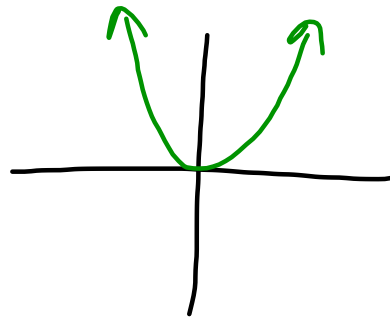
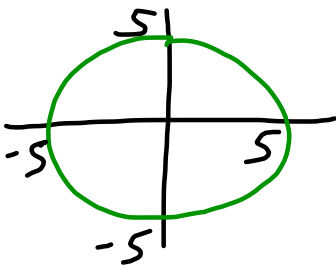
- a) $\{y \in \mathbf{R} \mid y \leq 3\}$ c) $\{y \in \mathbf{R} \mid 2 \leq y \leq 3\}$
 b) $\{y \in \mathbf{R} \mid y \geq 3\}$ d) $\{y \in \mathbf{R} \mid 0 \leq y \leq 2\}$



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16. The relation that is also a function is

- a) $x^2 + y^2 = 25$ c) $x^2 = y$
 b) $y^2 = x$ d) $x^2 - y^2 = 25$



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17. Given $f(x) = x^2 - 5x + 3$, then

- a) $f(-1) = -3$ c) $f(-1) = -1$
b) $f(-1) = 7$ **d) $f(-1) = 9$**

$$\begin{aligned} f(-1) &= (-1)^2 - 5(-1) + 3 \\ &= 1 - (-5) + 3 \\ &= 9 \end{aligned}$$

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18. Which of the following statements is not true?

- a) The horizontal line test can be used to show that a relation is a function.**
b) The set of all possible input values of a function is called the domain.
c) The equation $y = 3x + 5$ describes a function.
d) This set of ordered pairs describes a function:
 $\{(0, 1), (1, 2), (3, -3), (4, -1)\}$.

Vertical line test

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19. The range that best corresponds to $f(x) = \frac{3}{x}$ is

- a) $\{y \in \mathbb{R}\}$ c) $\{y \in \mathbb{R} \mid y < 0\}$
b) $\{y \in \mathbb{R} \mid y > 0\}$ d) $\{y \in \mathbb{R} \mid y \neq 0\}$

$x \neq 0$ in the domain
 $\Rightarrow y \neq 0$ in the range

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22. Which of the following statements is false?

- a) The domain of f is the range of f^{-1} .
b) The graph of the inverse can be found by reflecting $y = f(x)$ in the line $y = x$.
c) The domain of f^{-1} is the range of f .
d) To determine the equation of the inverse, interchange x and y and solve for x .

Solve for y , not x

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25. What transformations are applied to $y = f(x)$ to obtain the graph of $y = af(x - p) + q$, if $a < 0$, $p < 0$, and $q < 0$?
- a) Vertical stretch by a factor of $|a|$, followed by a translation $|p|$ units to the left and $|q|$ units down
 - b) Reflection in the x -axis, vertical stretch by a factor of $|a|$, followed by a translation $|p|$ units to the right and $|q|$ units down
 - c) Reflection in the x -axis, vertical stretch by a factor of $|a|$, followed by a translation $|p|$ units to the left and $|q|$ units down
 - d) Reflection in the x -axis, vertical stretch by a factor of $|a|$, followed by a translation $|p|$ units to the right and $|q|$ units up

VS/VC factor of $|a|$

$a < 0 \Rightarrow$ reflect
in x -axis

$p < 0 \Rightarrow$ HT left
 p units

$q < 0 \Rightarrow$ VT down
 q units

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