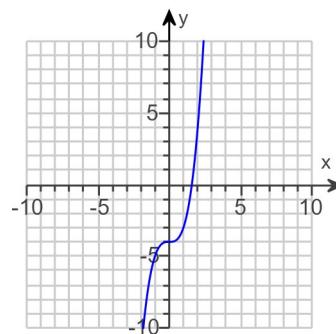


Student: Cole Lamers
Date: 10/19/19

Instructor: Viktoriya Shcherban
Course: Calc 1 11:30 AM / Internet
(81749&81750) Shcherban

Assignment: 7.1 Inverse Functions and Their Derivatives

1. Determine whether the graph of the function is the graph of a one-to-one function.



Is the graphed function one-to-one?

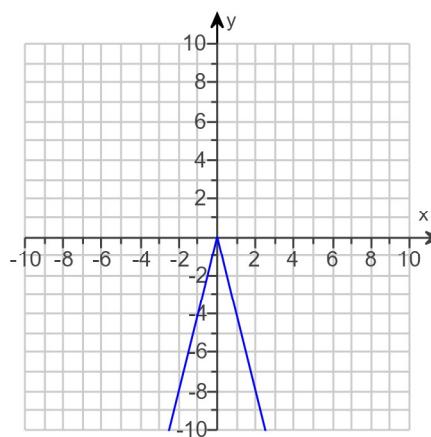
- Yes
 No

2. Determine if the function is one-to-one.

$$g(x) = -4|x|$$

Is the function one-to-one?

- Yes
 No

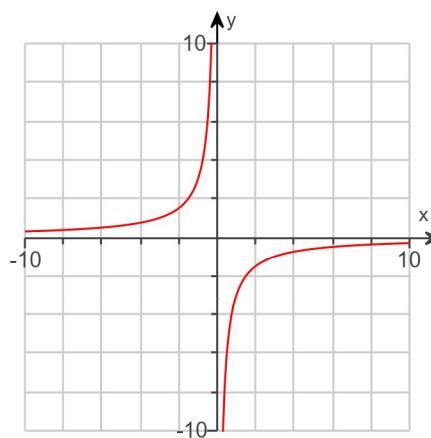


3. Determine whether the function is one-to-one.

$$y = -\frac{3}{x}$$

Is the function one-to-one?

- No
 Yes

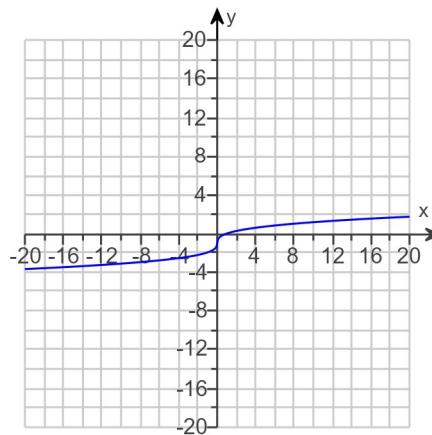


4.

Consider the graph of $y = x^{1/3} - 1$.

Is the function one-to-one?

- No
 Yes

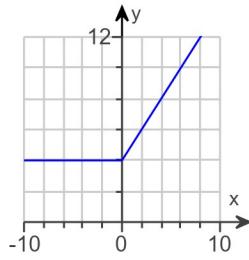


5. Determine from the graph of the following function whether it is one-to-one.

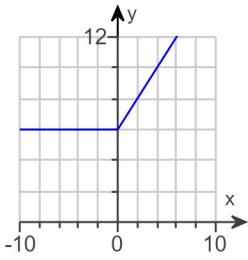
$$f(x) = \begin{cases} 4 + x, & x \geq 0 \\ 4, & x < 0 \end{cases}$$

Choose the correct graph below.

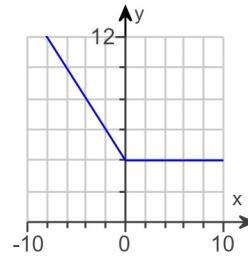
A.



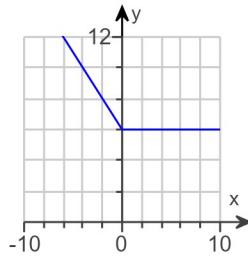
B.



C.



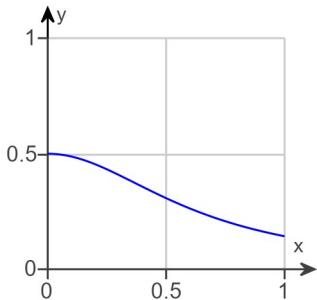
D.



Is $f(x)$ one-to-one?

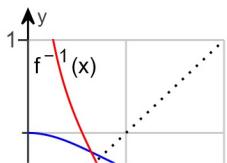
- No
 Yes

6. The graph of the function $f(x) = \frac{1}{5x^2 + 2}$, $x \geq 0$, is shown to the right. Use symmetry with respect to the line $y = x$ to add the graph of $f^{-1}(x)$ on the same graph. (It is not necessary to find a formula for $f^{-1}(x)$.) Identify the domain and range of f^{-1} .

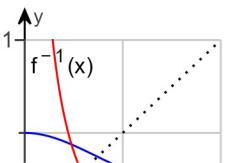


Choose the correct graph below.

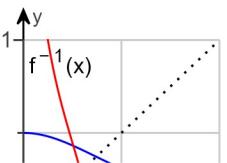
A.



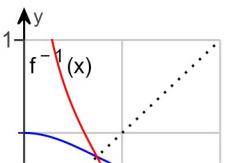
B.



C.



D.



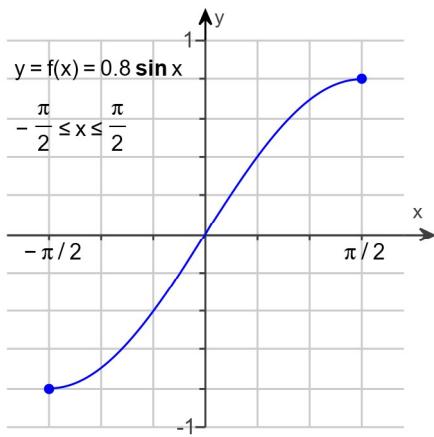
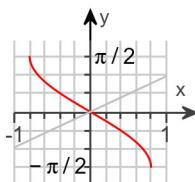
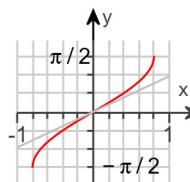
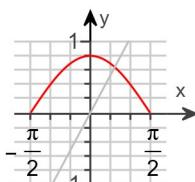
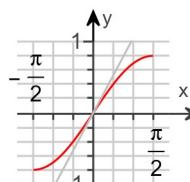
The domain of $f^{-1}(x)$ is .

(Simplify your answer. Type your answer in interval notation.)

The range of $f^{-1}(x)$ is .

(Simplify your answer. Type your answer in interval notation.)

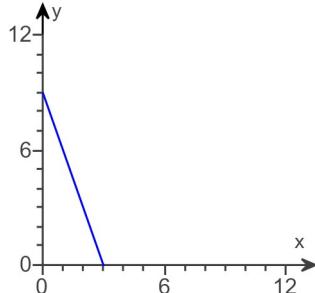
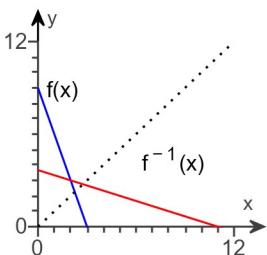
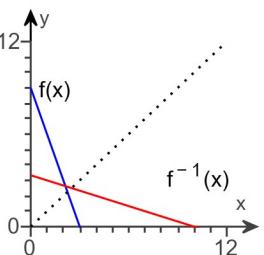
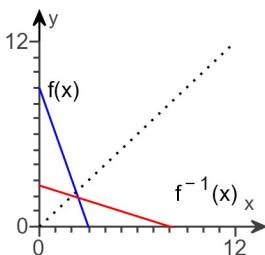
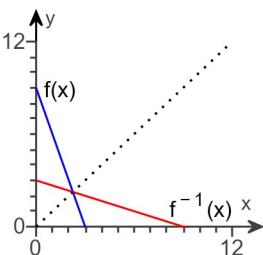
7.

Graph $f^{-1}(x)$. Identify the domain and range of $f^{-1}(x)$.Choose the correct graph of $f^{-1}(x)$. A. B. C. D.The domain of $f^{-1}(x)$ is .

(Type your answer in interval notation. Type an integer or a decimal.)

The range of $f^{-1}(x)$ is .(Type your answer in interval notation. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)

8. The graph of the function $f(x) = 9 - 3x$, $0 \leq x \leq 3$ is shown to the right. Use symmetry with respect to the line $y = x$ to add the graph of f^{-1} to the same graph. (It is not necessary to find a formula for f^{-1} .) Identify the domain and range of f^{-1} .

The graph of $y = x$ is shown as a dotted line. Choose the correct graph below. A. B. C. D.The domain of f^{-1} is The range of f^{-1} is 4 of 7

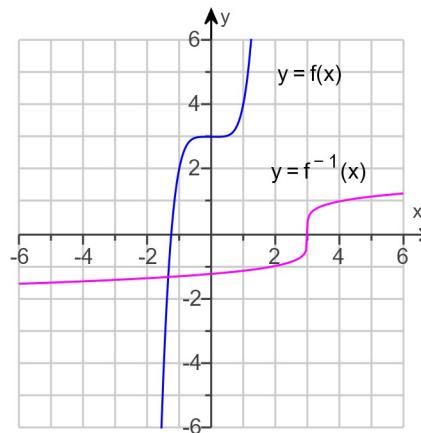
9.

- The formula for a function $y = f(x)$ and the graphs of f and f^{-1} are given. Find a formula for f^{-1} .

$$f(x) = x^5 + 3$$

$$f^{-1}(x) = \sqrt[5]{x - 3}$$

(Type an exact answer, using radicals as needed.)



10. A formula for a function $y = f(x)$ is $f(x) = 6x^5$. Find $f^{-1}(x)$ and identify the domain and range of $f^{-1}(x)$. To check the answer, determine whether $f(f^{-1}(x)) = f^{-1}(f(x)) = x$.

$$f^{-1}(x) = \sqrt[5]{\frac{x}{6}}$$

(Type an exact answer, using radicals as needed.)

What is the domain of $f^{-1}(x)$?

$(-\infty, \infty)$ (Type your answer in interval notation.)

What is the range of $f^{-1}(x)$?

$(-\infty, \infty)$ (Type your answer in interval notation.)

Does $f(f^{-1}(x)) = f^{-1}(f(x)) = x$?

Yes

No

11. Find $f^{-1}(x)$ and identify the domain and range of f^{-1} . As a check, show that $f(f^{-1}(x)) = f^{-1}(f(x)) = x$.

$$f(x) = \frac{25}{x^2}, x > 0$$

$$f^{-1}(x) = \frac{5}{\sqrt{x}}$$

(Type an exact answer, using radicals as needed.)

What is the domain of f^{-1} ?

$x > 0$ (Type an inequality or a compound inequality.)

What is the range of f^{-1} ?

$y > 0$ (Type an inequality or a compound inequality.)

12.

- A formula for a function $y = f(x)$ is $f(x) = \frac{x+1}{x-4}$. Find $f^{-1}(x)$ and identify the domain and range of $f^{-1}(x)$. To check the answer, determine whether $f(f^{-1}(x)) = f^{-1}(f(x)) = x$.

$$f^{-1}(x) = \frac{1+4x}{x-1}$$

What is the domain of $f^{-1}(x)$? Choose the correct answer below.

- A. $(-\infty, 1)$
- B. $(4, 15) \cup (15, \infty)$
- C. $[-1, 1] \cup (1, 4]$
- D. $(-\infty, 1) \cup (1, \infty)$

What is the range of $f^{-1}(x)$? Choose the correct answer below.

- A. $(-\infty, -1) \cup (-1, 1)$
- B. $(-\infty, 4) \cup (4, \infty)$
- C. $(4, 7) \cup (7, \infty)$
- D. $[-1, 0] \cup (0, 4]$

Does $f(f^{-1}(x)) = f^{-1}(f(x)) = x$? Choose the correct answer below.

- Yes
- No

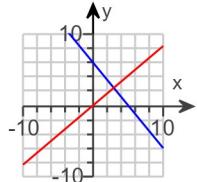
13.

- Let $f(x) = -\frac{6}{5}x + 6$. Find $f^{-1}(x)$. Graph $f(x)$ and $f^{-1}(x)$ together. Evaluate $\frac{df}{dx}$ at $x = 1$ and $\frac{df^{-1}}{dx}$ at $x = f(1)$.

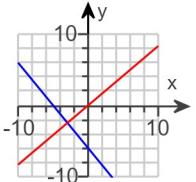
$$f^{-1}(x) = -\frac{5x-30}{6}$$

Choose the correct graphs of $f(x)$ (blue) and $f^{-1}(x)$ (red).

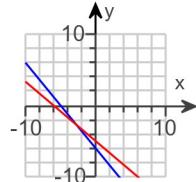
- A.



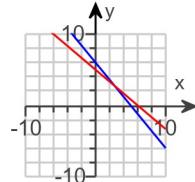
- B.



- C.



- D.



$$\left. \frac{df}{dx} \right|_{x=1} = -\frac{6}{5}; \left. \frac{df^{-1}}{dx} \right|_{x=f(1)} = -\frac{5}{6}$$

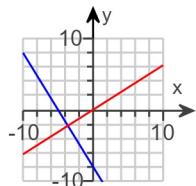
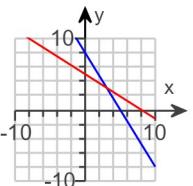
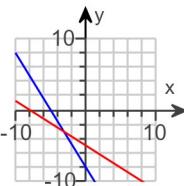
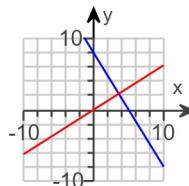
(Simplify your answers. Use integers or fractions for any numbers in the expressions.)

14.

Let $f(x) = -\frac{8}{5}x + 8$. Find $f^{-1}(x)$. Graph $f(x)$ and $f^{-1}(x)$ together. Evaluate $\frac{df}{dx}$ at $x = 1$ and $\frac{df^{-1}}{dx}$ at $x = f(1)$.

$$f^{-1}(x) = \boxed{-\frac{5x - 40}{8}}$$

Choose the correct graphs of $f(x)$ (blue) and $f^{-1}(x)$ (red).

 A. B. C. D.

$$\frac{df}{dx} \Big|_{x=1} = \boxed{-\frac{8}{5}} ; \frac{df^{-1}}{dx} \Big|_{x=f(1)} = \boxed{-\frac{5}{8}}$$

(Simplify your answers. Use integers or fractions for any numbers in the expressions.)

15. (a) Find the inverse of the function $f(x) = mx$, where m is a nonzero constant.

(b) What is the conclusion about the inverse of a function $y = f(x)$ whose graph is a line through the origin with a nonzero slope m ?

(a) $f^{-1}(x) = \boxed{\frac{x}{m}}$

(b) The graph of $f^{-1}(x)$ is the line passing through the origin.

The slope of the graph of $f^{-1}(x)$ is $\frac{1}{m}$.