FUNCTIONS: Inverse of Functions – 90%

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The question will cover a linear, cubic, exponential, logarithmic or rational function and may ask for:

- the inverse of a function, given the function, or
- the function, given the inverse of the function.

What is the inverse of $f(x) = x^3 - 2$?

(1) $f^{-1}(x) = \sqrt[3]{x} + 2$

(2) $f^{-1}(x) = \pm\sqrt[3]{x} + 2$

(3) $f^{-1}(x) = \sqrt[3]{x + 2}$

(4) $f^{-1}(x) = \pm\sqrt[3]{x + 2}$

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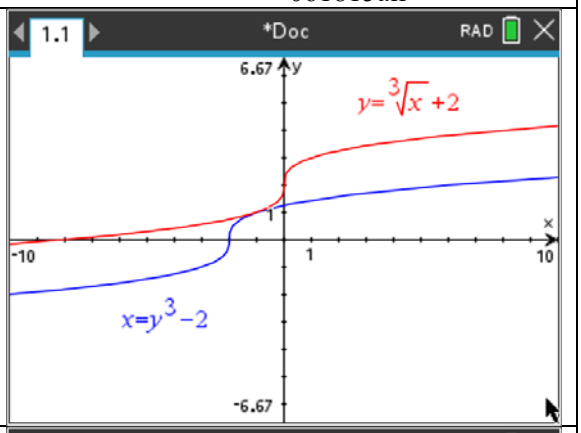
Add a Graphs page.

Rewrite the equation, replacing the function notation with *y*.

Enter the inverse of the equation in the question, replacing *x* with *y* and *y* with *x*.

Rewrite the equation in choice (1), replacing the function notation with *y*, and enter it.

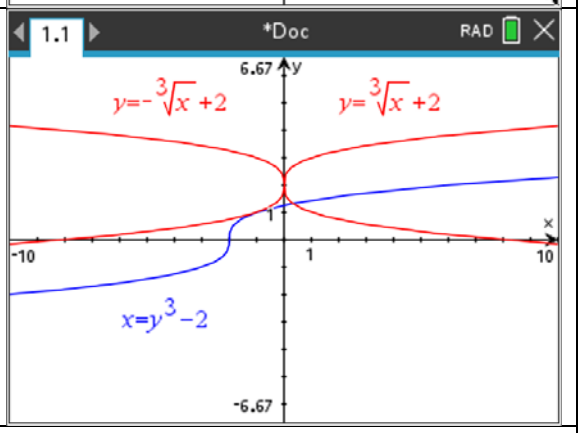
The graphs do not match.



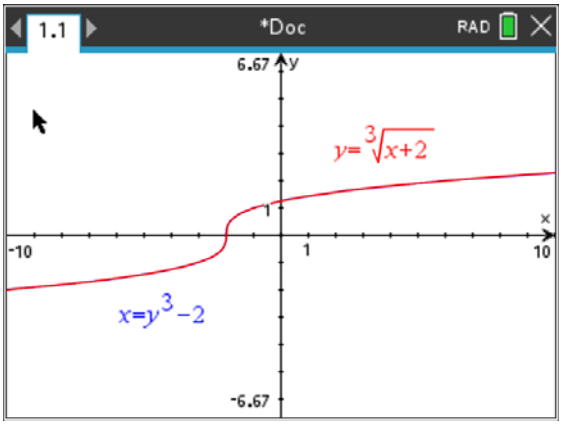
Edit the equation into choices (2)-(4) until the graphs match.

To enter choice (2), separately enter another equation with a minus sign.

The graphs do not match.



(3) is the correct response.



If this were an open ended question, algebraic work similar to this is required for full credit:

$$y = x^3 - 2$$
$$x = y^3 - 2$$
$$x + 2 = y^3$$
$$\sqrt[3]{x+2} = y$$

Another graphical approach identifies the inverse as a reflection over the line $y = x$.

If $f(x) = a^x$ where $a > 1$, then the inverse of the function is

(1) $f^{-1}(x) = \log_x a$ (3) $f^{-1}(x) = \log_a x$

(2) $f^{-1}(x) = a \log x$ (4) $f^{-1}(x) = x \log a$

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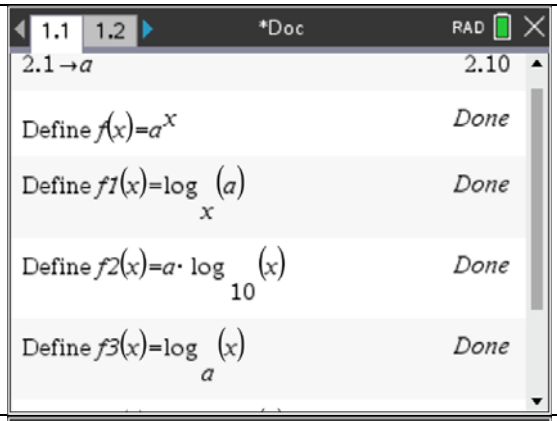
Add a Calculator page.

Enter 2.1 ctrl sto→var a to store a value for $a > 1$.

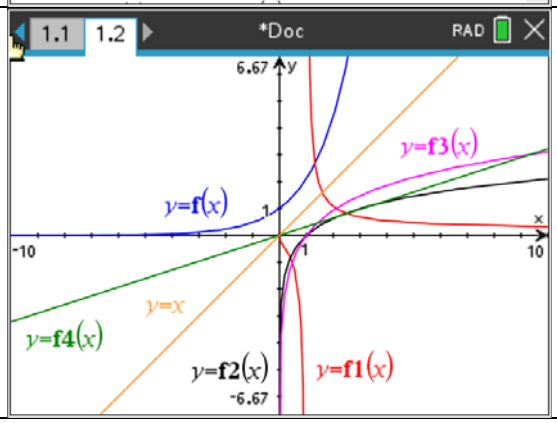
Enter menu 1, 1 to define the five functions in the question.



Add a Graphs page.

Enter the five functions, setting them equal to y. Also enter the equation $y = x$.

(3) is the correct response, as it represents a reflection of f over the line $y = x$.



If this were an open ended question, algebraic work similar to this is required for full credit:

$$x = a^y$$
$$\log x = \log a^y$$
$$\log x = y \log a$$
$$\frac{\log x}{\log a} = y$$
$$\log_a x = y$$

For more questions, go to https://www.jmap.org/htmlstandard/F.BF.B.4.htm.