

**PRACTICE MIDTERM II***Part I: No Calculator*

1. Use Table 1 and Figure 1 to compute the following, if they exist.

TABLE 1

$x$	1	2	3	4
$f(x)$	-10	0	3	-3
$g(x)$	5	-1	4	0

a.  $g^{-1}(4)$

b.  $h^{-1}(-2)$

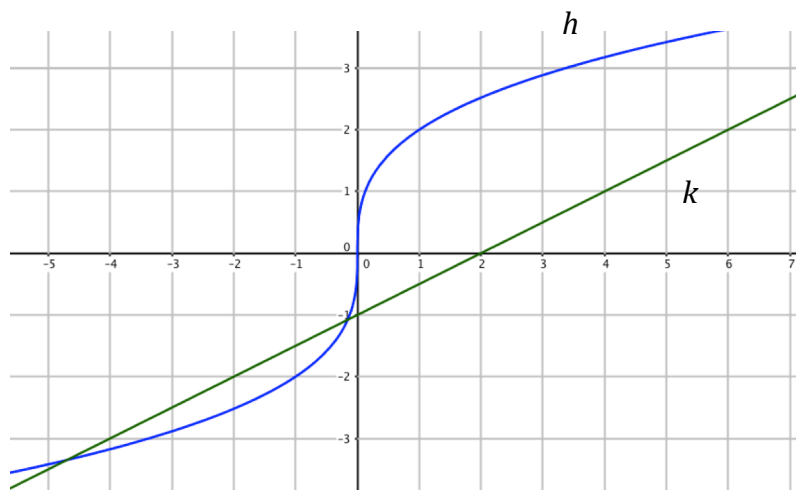
c.  $k^{-1}(2)$

d.  $f^{-1}(g(4))$

FIGURE 1

e.  $h(k^{-1}(-1))$

f. Is the inverse of  $g(x)$  a function (i.e. is it invertible)? Justify your answer.



2. Simplify the following expressions as much as possible.

a.  $\log_8(8^{-6})$

c.  $\log\left(\frac{1}{100}\right)$

b.  $\ln(e^{10})$

d.  $4 \log(1000)$

3. Let  $g(x) = \frac{2}{7x-3}$

a. Find  $g^{-1}(x)$

b. Show that  $g^{-1}(g(x)) = x$

4. Solve the following equation. Clearly state your solution and list any extraneous solutions.

a.  $1 - \log_4(x + 7) = \log_4(x + 4)$

b.  $9 = 3e^{2x-1}$

c.  $16^{2x} = 4^{2x+1}$

5. Write the expression below using a single logarithm. Simplify as much as possible.

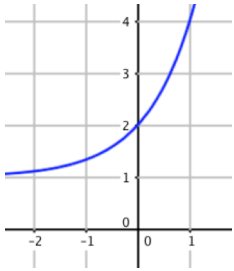
$$\log\left(\frac{x-2}{x}\right) - \log\left(\frac{x+2}{x}\right) + \log(x^2)$$

6. Match the function to the graph by writing the letter of the function beneath the graph.

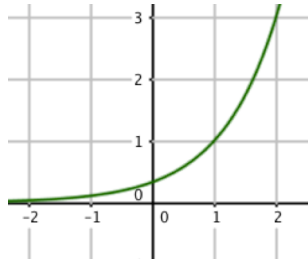
- a.  $-3^x$
- b.  $3^{x-1}$

- c.  $3^{-x}$
- d.  $3^x + 1$

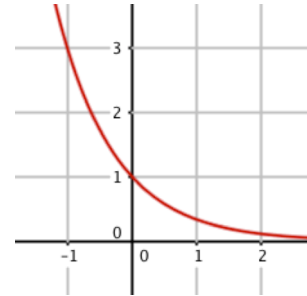
- e.  $3^x$



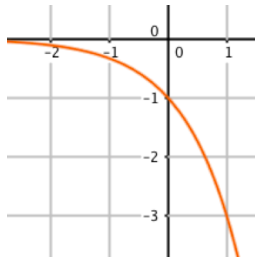
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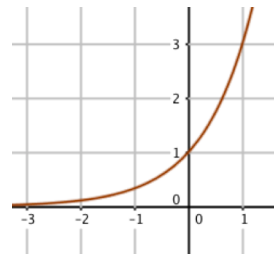
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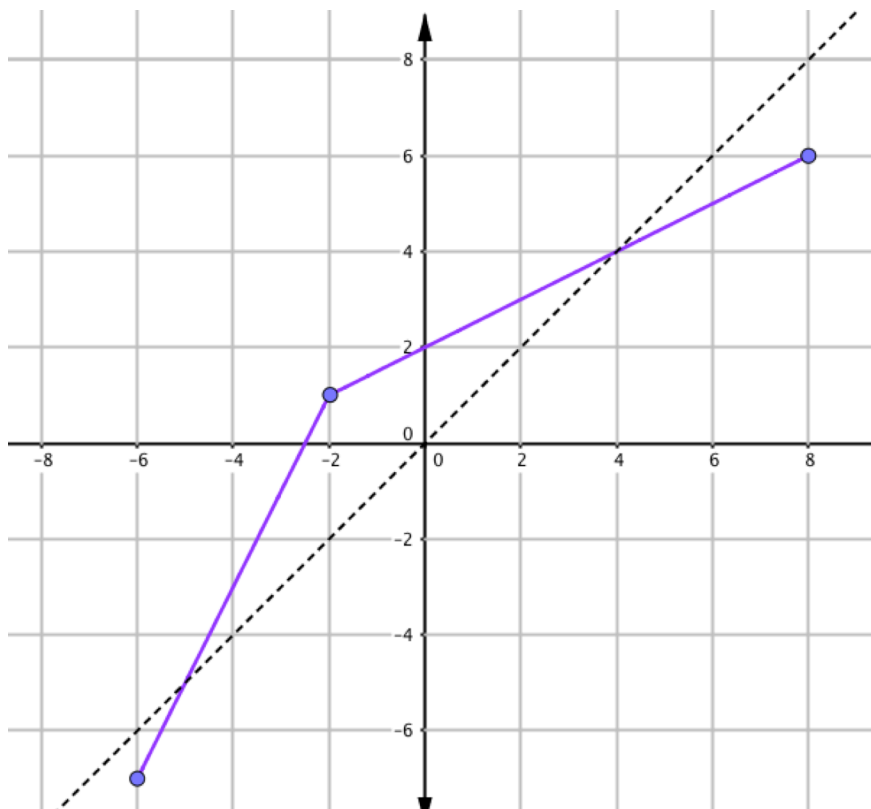


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7. Sketch the graph of the inverse of the function below.



8. Complete the following for the functions  $f$ ,  $g$ , and  $h$ . Use builder set notation or interval notation to state the domain and range.

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

$$g(x) = 5^{x-1} + 2$$

$$h(x) = \log_5(x)$$

Domain:

Domain:

Domain:

Range:

Range:

Range:

Asymptote(s):

Asymptote(s):

Asymptote(s):

### ***Part II: Calculator Required***

9. Find the equation of an exponential function that passes through the points  $(-1, 8)$  and  $(2, 1)$ .

10. Tom invests \$10,000 into an account earning 5.915% interest that compounds continuously. Jerry invests \$8,000 into an account earning 5.95% interest that compounds quarterly.

a) What is the value of Jerry's investment after 5 years? Show all your work and round your answer accurately to three decimal places.

b) How long will it take for Tom's investment to double?

11. A sample of Strontium 90 decays according to the function  $A(t) = 50e^{-0.244t}$ , where  $A(t)$  is the amount present in grams after  $t$  years.

a) How many grams of Strontium 90 does the sample initially contain?

b) How much Strontium 90 is present after 15 years?

c) How many years does it take for the sample to contain 25 grams of Strontium 90? State the exact answer, showing all algebraic work. Round your answer accurately to three decimal places.