

SCORE: _____ / 102 POINTS

- ALL PROBLEMS MUST BE SOLVED ALGEBRAICALLY TO EARN CREDIT
- PUT A BOX AROUND EACH FINAL ANSWER
- SHOW COMPLETE AND PROPER WORK TO EARN FULL CREDIT

NO CALCULATORS ALLOWED

Evaluate the following. Write "UNDEFINED" if the value does not exist.

SCORE: ____ / 14 POINTS

[a] $\log_{10} 10,000,000 = 7$

[b] $\log_8 1 = 0$

[c] $\log_4 64 = 3$

[d] $10^{\log(-5)} = \text{UNDEFINED}$

[e] $\log_5 0 = \text{UNDEFINED}$

[f] $\log_8 8^{-3} = -3$

[g] $3^{\log_3 7} = 7$

Find the equation of the asymptote of $f(x) = -4\log_3(x-6)$.

SCORE: ____ / 6 POINTS

$$\begin{aligned} x-6 &= 0 \\ \boxed{x=6} \end{aligned}$$

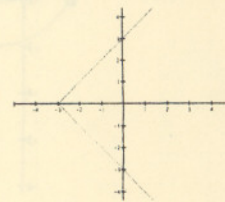
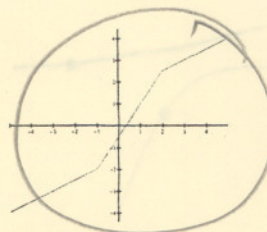
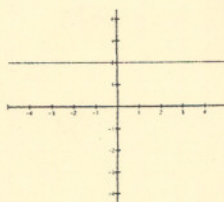
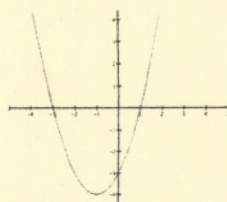
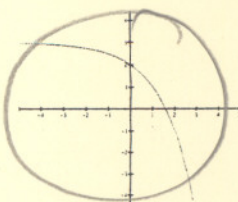
Find the domain of the function $f(x) = 4 - \frac{7}{6-3x}$.

SCORE: ____ / 6 POINTS

$$\begin{aligned} 6-3x &\neq 0 \\ -3x &\neq -6 \\ \boxed{\{x \neq 2\}} \end{aligned}$$

Circle the two graphs below which represent one-to-one functions.

SCORE: ____ / 6 POINTS



Write $\log 12 - \log 6 + \log 2$ as the logarithm of a single quantity. Simplify your answer.

SCORE: ___ / 6 POINTS

$$\log\left(\frac{12}{6} \cdot 2\right) = \boxed{\log 4}$$

Solve for x : $\log_5(x^2 - 9) - \log_5(1 - x) = 1$. CHECK YOUR ANSWER(S).

SCORE: ___ / 10 POINTS

$$\log_5 \frac{x^2 - 9}{1 - x} = 1$$

$$\frac{x^2 - 9}{1 - x} = 5^1 = 5$$

$$x^2 - 9 = 5 - 5x$$

$$x^2 + 5x - 14 = 0$$

$$(x + 7)(x - 2) = 0$$

$$\boxed{x = -7 \text{ or } x = 2}$$

CHECK: $x = -7$

$$\log_5(49 - 9) - \log_5(1 - (-7))$$

$$= \log_5 40 - \log_5 8$$

$$= \log_5 5$$

$$= 1 \checkmark$$

~~$x = 2$~~

$$\log_5(4 - 9) - \log_5(1 - 2)$$

$$= \log_5(-5) - \log_5(-1)$$

Find the range of the function $f(x) = 9 - \sqrt{7 + x}$.

SCORE: ___ / 6 POINTS

$$\sqrt{7 + x} \geq 0$$

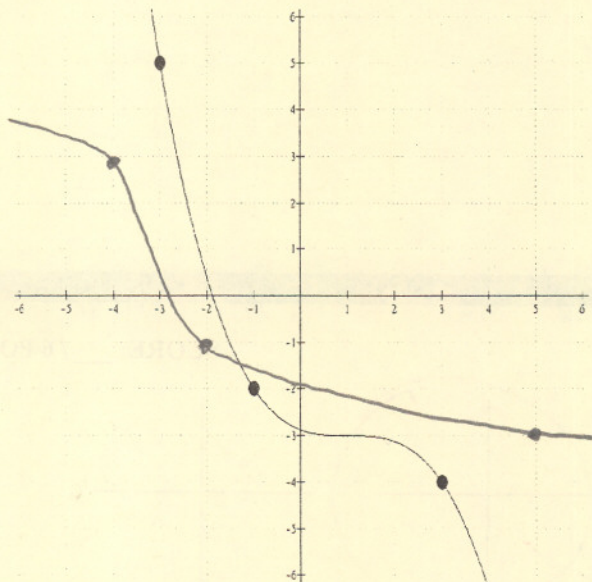
$$-\sqrt{7 + x} \leq 0$$

$$9 - \sqrt{7 + x} \leq 9$$

$$\boxed{\{y \leq 9\}}$$

Sketch the graph of the inverse of the following function on the same set of axes.

SCORE: ___ / 10 POINTS



Write $\log \frac{a^2}{bc^3}$ as the sums and/or differences and/or multiples of logarithms of single variables.

SCORE: ___ / 6 POINTS

$$2 \log a - \log b - 3 \log c$$

If $f(x) = 2x^2 - 3x - 1$, find $f(a-3)$.

SCORE: ___ / 8 POINTS

$$\begin{aligned} f(a-3) &= 2(a-3)^2 - 3(a-3) - 1 \\ &= 2(a^2 - 6a + 9) - 3a + 9 - 1 \\ &= 2a^2 - 12a + 18 - 3a + 8 \\ &= 2a^2 - 15a + 26 \end{aligned}$$

Solve for x : $2^{1-2x} = 32$. CHECK YOUR ANSWER(S).

SCORE: ___ / 8 POINTS

$$2^{1-2x} = 2^5$$

$$1-2x = 5$$

$$-2x = 4$$

$$x = -2$$

$$\begin{aligned} \text{CHECK: } 2^{1-2(-2)} &= 2^{1-(-4)} \\ &= 2^{1+4} \\ &= 2^5 \\ &= 32 \end{aligned}$$

Find the inverse of the function $f(x) = 9 - \sqrt{7+x}$.

SCORE: ___ / 10 POINTS

$$y = 9 - \sqrt{7+x}$$

$$x = 9 - \sqrt{7+y}$$

$$x - 9 = -\sqrt{7+y}$$

$$(x-9)^2 = 7+y$$

$$(x-9)^2 - 7 = y$$

$$f^{-1}(x) = (x-9)^2 - 7$$

Circle the two graphs below which represent functions.

SCORE: ___ / 6 POINTS

