SCORE: _____ / 101 POINTS   **NO CALCULATORS ALLOWED**
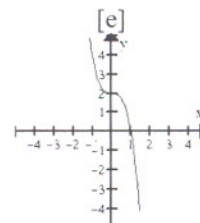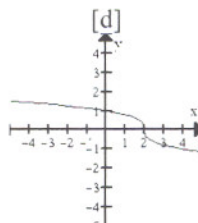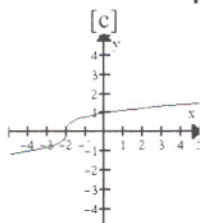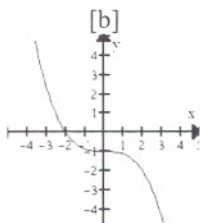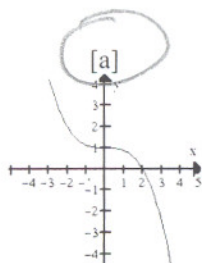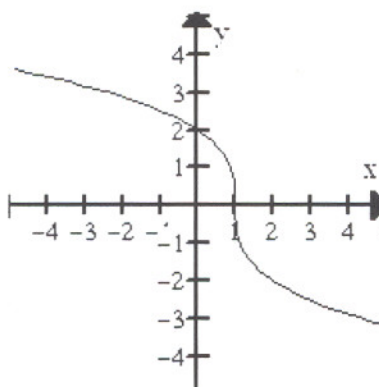

Fill in the blanks. Write "**UNDEFINED**" if the value does not exist. [**NO NEED TO SHOW WORK**]   SCORE: ___ / 21 POINTS

$\log_9 9^0 =$ ___0___ $\log_{13} 1 =$ ___0___ $\log_3 -9 =$ _UNDEFINED_ $3^{\log_3 4} =$ ___4___

$\log_2 32 =$ ___5___ $2^{\log_2 0} =$ _UNDEFINED_ $\log 100{,}000 =$ ___5___
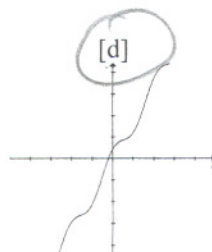

Circle the graph of the inverse of the following function.   SCORE: ___ / 6 POINTS

[a]   [b]   [c]   [d]   [e]

Circle the **two** graphs below which represent one-to-one functions.   SCORE: ___ / 6 POINTS

[a]   [b]   [c]   [d]   [e]
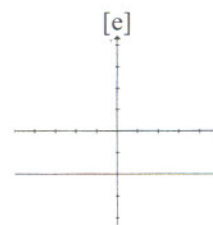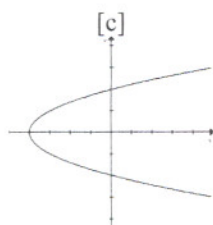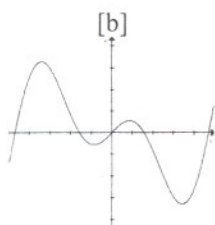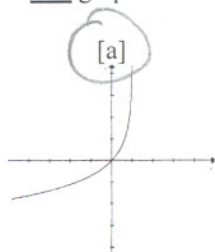
Circle the domain of $f(x) = \log_2 x$.   SCORE: ___ / 3 POINTS

[a] $\{x > 2\}$ [b] $\{x > 0\}$ [c] $\{x \neq 0\}$ [d]   **R**   [e] $\{x \neq 2\}$

Circle the asymptote of $f(x) = 3^x$.   SCORE: ___ / 3 POINTS

[a] $x = 0$ [b] $y = 3$ [c] $y = 0$ [d] $y = 1$ [e] $x = 3$

Find the range of the function $f(x) = 3 - \sqrt{6-x}$. **SHOW PROPER WORK.** SCORE: ___ / 6 POINTS

$$\sqrt{6-x} \geq 0$$
$$-\sqrt{6-x} \leq 0$$
$$-\sqrt{6-x} + 3 \leq 0 + 3$$
$$\boxed{\{y \leq 3\}}$$

Find the equation of the asymptote of $f(x) = 6\log_8(x+3)$. **SHOW PROPER WORK.** SCORE: ___ / 6 POINTS

$$x + 3 = 0$$
$$\boxed{x = -3}$$

Find the inverse of the function $f(x) = 2 - \sqrt{5+x}$. **SHOW PROPER WORK.** SCORE: ___ / 10 POINTS

$$y = 2 - \sqrt{5+x}$$
$$x = 2 - \sqrt{5+y}$$
$$x - 2 = -\sqrt{5+y}$$
$$(x-2)^2 = (-\sqrt{5+y})^2$$
$$(x-2)^2 = 5 + y$$

$$\boxed{y = (x-2)^2 - 5}$$

Find the domain of the function $f(x) = \dfrac{7}{3x+12} + 5$. **SHOW PROPER WORK.** SCORE: ___ / 6 POINTS

$$3x + 12 \neq 0$$
$$3x \neq -12$$
$$\boxed{\{x \neq -4\}}$$

Solve for x: $8^{x+6} = 4^{-x-1}$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).**   SCORE: ___ / 10 POINTS

$(2^3)^{x+6} = (2^2)^{-x-1}$

$2^{3(x+6)} = 2^{2(-x-1)}$

$3(x+6) = 2(-x-1)$

$3x+18 = -2x-2$

$5x = -20$

$\boxed{x = -4}$

CHECK:

$8^{-4+6} = 8^2 = 64$

$4^{-(-4)-1} = 4^3 = 64$ ✓

Write $\log 54 - \log 9 + \log 3$ as the logarithm of a single quantity. **Simplify your answer.**   SCORE: ___ / 6 POINTS

$\log \frac{54}{9} + \log 3$

$= \log\left(\frac{54}{9} \cdot 3\right)$

$= \log 18$

Write $\log \dfrac{y^5}{wz^4}$ as the sums and/or differences and/or multiples of logarithms of single variables.   SCORE: ___ / 6 POINTS

$\log y^5 - \log wz^4$

$= \log y^5 - (\log w + \log z^4)$

$= 5\log y - (\log w + 4\log z) = \boxed{5\log y - \log w - 4\log z}$

Solve for x: $\log_3(x^2 - 22) - \log_3(x-4) = 2$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).**   SCORE: ___ / 12 POINTS

$\log_3 \frac{x^2-22}{x-4} = 2$

$3^{\log_3 \frac{x^2-22}{x-4}} = 3^2$

$\frac{x^2-22}{x-4} = 9$

$x^2-22 = 9(x-4)$

$x^2-22 = 9x-36$

$x^2-9x+14 = 0$

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

$x = 2, 7$

CHECK:

$x=2$ $\log_3(-18)$ UNDEFINED ✗

$\boxed{x=7}$ $\log_3 27 - \log_3 3 = 3-1 = 2$ ✓