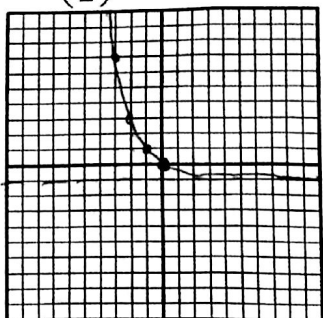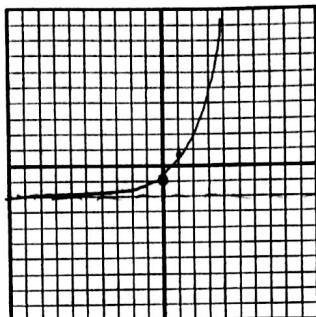# 10.1 to 10.6 Review
Algebra 2

KEY

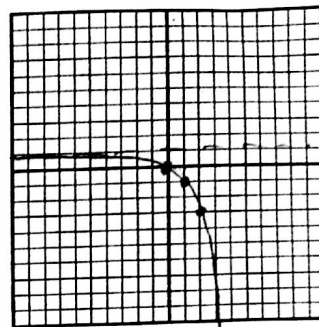**Graph each exponential or logarithmic function.**

1. $y = \left(\dfrac{1}{2}\right)^x - 1$
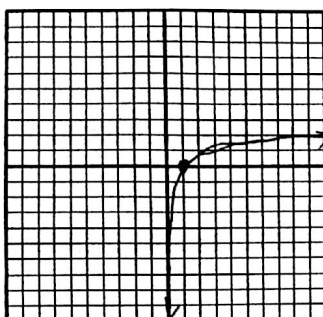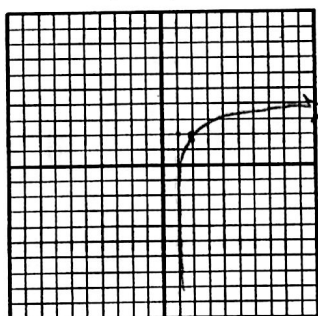

2. $y = e^x - 2$
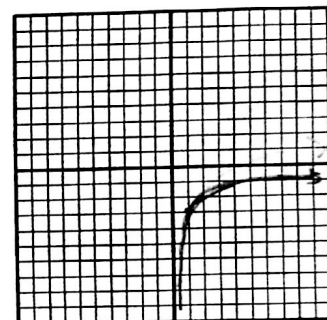

3. $y = -2^x + 1$

4. $y = 0.5 \ln x$

5. $y = \log(x-1) + 2$

6. $y = \log_3 x - 3$

7. Use the rules of exponents to simplify each expression.

A. $5^{\sqrt{2}} \cdot 5^{\sqrt{5}}$

$5^{\sqrt{2} + \sqrt{5}}$

B. $16^{\sqrt{8}} \cdot 2^{\sqrt{18}}$

$2^{4\sqrt{8}} \cdot 2^{\sqrt{18}} = 2^{4 \cdot 2\sqrt{2}} \cdot 2^{3\sqrt{2}}$

$2^{8\sqrt{2} + 3\sqrt{2}}$

$2^{11\sqrt{2}}$

C. $\left(3^{\sqrt{5}}\right)^{\sqrt{10}} = 3^{\sqrt{50}} = 3^{5\sqrt{2}}$

$3^{5\sqrt{2}}$

8. Solve each equation.

A. $16^{m+2} = 4^{5-m}$

$4^{2(m+2)} = 4^{5-m}$

$2m + 4 = 5 - m$

$3m = 1$

$m = 1/3$

B. $9^{3c+1} = 27^{3c-1}$

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

$6c + 2 = 9c - 3$

$5 = 3c$

$c = 5/3$

$c = 5/3$

C. $27^{2x-4} = 3^{5x}$

$3^{3(2x-4)} = 3^{5x}$

$6x - 12 = 5x$

$-12 = -x$

$x = 12$

$x = 12$

D. $\left(\dfrac{1}{5}\right)^{x-5} = 25^{3x+2}$

$5^{-1(x-5)} = 5^{2(3x+2)}$

$-x + 5 = 6x + 4$

$1 = 7x \quad x = 1/7$

$x = 1/7$

9. Evaluate each expression.

A. $\log_{16} 4 = x$

$16^x = 4 \quad 4^{2x} = 4^1$

$2x = 1$

$x = \frac{1}{2}$

B. $\log_2 32 = x$

5

C. $\log_{\frac{1}{3}} \frac{1}{3}$

1

D. $\log_3 \frac{1}{9} = x$

$3^x = 9^{-1}$

$3^x = 3^{-2}$

$x = -2$

10. Solve each equation.

A. $\log_{25} x = \frac{3}{2}$

$25^{3/2} = x$
$5^3 = x$

$\underline{\quad x = 125 \quad}$

B. $\log_x (3x+4) = 2$

$x^2 = 3x+4$
$x^2 - 3x - 4 = 0$
$(x-4)(x+1) = 0$
$x = 4 \quad \cancel{x} \cancel{=} \cancel{-1}$

$\underline{\quad x = 4 \quad}$

C. $\log_9 (x^2 - 4x) = \log_9 (3x-10)$

$x^2 - 4x = 3x - 10$
$x^2 - 7x + 10 = 0$
$(x-2)(x-5) = 0$

$\underline{\quad x = 5 \quad}$

D. $\log_6 \frac{1}{36} = x$

$6^x = \frac{1}{36}$
$6^x = 6^{-2}$

$\underline{\quad x = -2 \quad}$

11. Expand each expression.

A. $\log_3 x^4 y^5$

$\underline{\quad 4\log_3 x + 5\log_3 y \quad}$

B. $\log_4 \frac{a^7}{b^4}$

$\underline{\quad 7\log_4 a - 4\log_4 b \quad}$

C. $\log_5 (5z^5)^2$

$2\log_5 (5z^5)$
$2\log_5 5 + 2 \cdot 5 \log_5 z$

$\underline{\quad 2 + 10\log_5 z \quad}$

12. Condense each expression.

A. $\frac{3}{4}\log x + 5\log y$

$\underline{\quad \log(x^{3/4} y^5) \quad}$

B. $2\log_2 (c+2) - 5\log_2 (d-4)$

$\log_2 \frac{(c+2)^2}{(d-4)^5}$

C. $3\log a - 5\log b$

$\log\left(\frac{a^3}{b^5}\right)$

13. Solve each equation.

A. $2\log_7 x = \log_7 27 + \log_7 3$

$\log_7 x^2 = \log_7 81$
$x^2 = 81 \quad x = \pm 9$

$\underline{\quad x = 9 \quad}$

B. $\log_6 x + \log_6 (x+5) = 2$

$\log_6 x(x+5) = 2$
$6^2 = x^2 + 5x \quad x^2 + 5x - 36 = 0$
$\quad\quad x \cancel{=} \cancel{-9} \; x = 4$

$\underline{\quad x = 4 \quad}$

C. $\log 3x - \log 18 = \log 2$

$\log \frac{3x}{18} = \log 2$
$\frac{x}{6} = 2$

$\underline{\quad x = 12 \quad}$

D. $\log_4 z + \log_4 (z+6) = 2$

$\log_4 (z^2 + 6z) = 2$
$16 = z^2 + 6z \quad z^2 + 6z - 16 = 0$
$\quad -8, +2$

$\underline{\quad z = 2 \quad}$

E. $\log_3 (x+4) - \log_3 (x+1) = \log_3 3$

$\log_3 \left(\frac{x+4}{x+1}\right) = 1$
$3 = \frac{x+4}{x+1} \quad 3x+3 = x+4$
$\quad\quad 2x = 1$

$\underline{\quad x = 1/2 \quad}$

F. $3^x = 40 \quad x\ln 3 = \ln 40$

$\underline{\quad x = 3.358 \quad}$

G. $\log_4 (y+4) + \log_4 (y-2) = \log_4 (y-2)$

$\log_4 ((y+4)(y-2)) = \log_4 (y-2)$
$y^2 + 2y - 8 = y - 2 \quad y^2 + y - 6 = 0$
$\quad\quad\quad\quad (y+3)(y-2) = 0$

$\underline{\text{No Solution}} \quad \cancel{y = -3} \; \cancel{y = 2}$

H. $4^{n+2} = 14.5$

$n + 2 = 1.929$

$(n+2)\ln 4 = \ln 14.5$

$\underline{\quad n = -0.071 \quad}$

I. $3^{4x-3} = 12$

$(4x-3)\ln 3 = \ln 12$
$4x - 3 = 2.262$
$4x = 5.262$
$x = 1.3155$

$\underline{\quad x = 1.3155 \quad}$