Openers #5

Name: Key

Each day when you come into class, there will be a problem projected for you to complete. Find the appropriate box to complete the problem in and work on it when you arrive.

Date:

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5-1

Solve. $6^{7-x} = 6^{2x+1}$

$7 - x = 2x + 1$

$\frac{6}{3} = \frac{3x}{3}$

$2 = x$

Solve. $9^{(x^\wedge 2)} = 3^{3x+2}$

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

$2x^2 = 3x + 2$

$2x^2 - 3x - 2 = 0$

$(2x+1)(x-2) = 0$

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

Solve. $9^{2x} \bullet (\frac{1}{3})^{x+2} = 27 \bullet (3^x)^{-2}$

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

$4x + -x - 2 = 3 + -2x$

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

$\frac{5x}{5} = \frac{5}{5}$

$x = 1$

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5-2

If $20,000 is deposited in a savings account that pays interest at a rate of 8% per year compounded continuously, find the balance after 5 years.

$A = Pe^{rt}$

$= 20{,}000e^{.08(5)}$

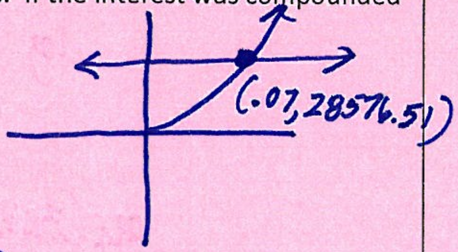
$= \$29{,}836.49$

An investment of $10,000 increased to $28,576.51 in 15 years. If the interest was compounded continuously, find the rate.

$A = Pe^{rt}$

$28{,}576.51 = 10{,}000e^{r(15)}$

7%



Solve. $e^{(x^\wedge 2)} = e^{2x+3}$

$x^2 = 2x + 3$

$x^2 - 2x - 3 = 0$

$(x-3)(x+1) = 0$

$x = 3$ $x = -1$

Date:

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5-3

Change to log form. $C^p = d$ $\log_c d = p$

Change to exponential form. $\log_6(2x-1) = 3$ $6^3 = 2x-1$

Solve for t using logs. $2a^{t/3} = 5$ $a^{\frac{t}{3}} = \frac{5}{2} \rightarrow \log_a \frac{5}{2} = \frac{t}{3} \rightarrow 3\log_a \frac{5}{2} = t$

Find the number. $\log_3 243$ $\log_3 3^5 = 5$

Find the number. $e^{\ln 8}$ $e^{\ln_e 8} = 8$

Solve. $\log_4 x = \frac{-3}{2}$

$4^{-\frac{3}{2}} = x \rightarrow (\sqrt{4})^{-3} = 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

Date:

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5-4

Express in terms of logs.

(a) $\log_3 \sqrt[5]{y}$ $\log_3 y^{\frac{1}{5}} = \frac{1}{5}\log_3 y$

(b) $\log \frac{\sqrt[3]{2}}{x\sqrt{y}}$ $\log \frac{2^{\frac{1}{3}}}{x y^{\frac{1}{2}}} = \frac{1}{3}\log 2 - \left(\log x + \frac{1}{2}\log y\right)$

Write the expression as one log.

(a) $\frac{1}{3}\log_4 w$ $\log_4 w^{\frac{1}{3}} = \log_4 \sqrt[3]{w}$

(b) $5\log_a x - \frac{1}{2}\log_a(3x-4) - 3\log_a(5x+1)$

$\log_a \frac{x^5}{\sqrt{3x-4}\,(5x+1)^3}$

Solve.

(a) $\log(x+2) - \log x = 2\log 4$

$\log \frac{x+2}{x} = \log 4^2 \rightarrow \frac{x+2}{x} = 16$

$16x = x+2$

$15x = 2$

$x = \frac{2}{15}$

(b) $\log_4(3x+2) = \log_4 5 + \log_4 3$

$\log_4(3x+2) = \log_4(5 \cdot 3)$

$\log_4(3x+2) = \log_4(15)$

$3x+2 = 15 \rightarrow \frac{3x}{3} = \frac{13}{3}$

$x = \frac{13}{3}$

Date:	5-5
___/___/___	Estimate $\log_2 20$ $\frac{\log 20}{\log 2} \approx 4.322$

Find the exact solution using logs.

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

$$(2x+3)\log 4 = (x-2)\log 5$$

$$2x\log 4 + 3\log 4 = x\log 5 - 2\log 5$$

$$2x\log 4 - x\log 5 = -2\log 5 - 3\log 4$$

$$\frac{x\cancel{(2\log 4 - \log 5)}}{\cancel{(2\log 4 - \log 5)}} = \frac{-2\log 5 - 3\log 4}{(2\log 4 - \log 5)} \approx -6.34$$

(b) $5^{2x+1} = 6^{x-2}$

$$(2x+1)\log 5 = (x-2)\log 6$$

$$2x\log 5 + \log 5 = x\log 6 - 2\log 6$$

$$2x\log 5 - x\log 6 = -2\log 6 - \log 5$$

$$\frac{x\cancel{(2\log 5 - \log 6)}}{\cancel{(2\log 5 - \log 6)}} = \frac{-2\log 6 - \log 5}{(2\log 5 - \log 6)}$$

$$x \approx -3.64$$