MTH-PT Trigonometry Session 4 2/6

An actual iron man suit is $78,000. How long would it take Nate to save up to purchase it if he started with $10,000 and placed it into a continuously compounding account with 9% interest?

$$A = Pe^{rt}$$

$$\frac{78,000}{10,000} = \frac{10,000e^{(0.09)t}}{10,000}$$

$$\ln(7.8) = \ln\left(e^{0.09t}\right)$$

$$\frac{\ln 7.8}{0.09} = \frac{0.09t}{0.09}$$

$$\boxed{22.8 \text{ yrs} = t}$$

$\log_2 2^{3x} = \log 28$

$3x \log 2 = \log 28$

$\frac{3x \log 2}{3 \log 2} = \frac{\log 28}{3 \log 2}$

$x = \frac{\log 28}{3 \log 2} = \boxed{1.6}$

$\log 8^x = \log 82$

$x \log 8 = \log 82$

$\frac{x \log 8}{\log 8} = \frac{\log 82}{\log 8}$

$x = \frac{\log 82}{\log 8}$

Expanding Logarithms

$$\left[\log \frac{(10{,}000)(1{,}000)}{100}\right] = \log \frac{10{,}000{,}000}{100} \quad ② \quad ①$$

$\log \frac{(10{,}000)(1{,}000)}{100} = ⑤$

$\log \frac{(10^4)(10^3)}{10^2}$

$10^4 * 10^3 = 10^{4+3} = 10^7$

mult → add

$\frac{10^7}{10^2} = 10^{7-2} = 10^5$

Divide → subtract

$\log 100{,}000$

$\log_{10} 100{,}000 = x$

$10^x = 100{,}000$

$10^5 = 100{,}000$

$x = 5$

$$\log \frac{10^4 * 10^3}{10^2}$$

Mult → Add

Div → Sub

$$\log_{10} 10^4 + \log 10^3 - \log 10^2$$

$$4 + 3 - 2$$

$$7 - 2 = 5$$

$$\log \frac{ac}{de} \quad \begin{matrix} \oplus \\ \ominus \end{matrix} = \log a + \log c - \log d - \log e$$

$$\log a + \log c - (\log d + \log e)$$

$$\log \left(\frac{a^7 b^8}{c^4} \right) \quad \begin{matrix} \oplus \\ \ominus \end{matrix} = \log a^7 + \log b^8 - \log c^4$$

$$\boxed{7 \log a + 8 \log b - 4 \log c}$$

$$\log_2 \frac{x^9}{y^7 z^3} = \log_2 x^9 - \log_2 y^7 - \log_2 z^3$$

$$9\log_2 x - 7\log_2 y - 3\log_2 z$$

$$3\log_4 x + 2\log_4 y - 8\log_4 z$$

$$\log_4 \frac{x^3 y^2}{z^8}$$

$$\log_b \frac{x^{\frac{1}{2}}}{y^{\frac{2}{3}}} = \log_b x^{\frac{1}{2}} - \log_b y^{\frac{2}{3}}$$

$$\frac{1}{2}\log_b x - \frac{2}{3}\log_b y$$

$$\log_8 \left(\sqrt{r}\sqrt[3]{t}\right) = \log_8 \sqrt{r} + \log_8 \sqrt[3]{t}$$

$$\log_8 r^{\frac{1}{2}} + \log_8 t^{\frac{1}{3}}$$

$$\frac{1}{2}\log_8 r + \frac{1}{3}\log_8 t$$

$$\log\left(x^2\sqrt{x+5}\right) = \log x^2 + \log (x+5)^{\frac{1}{2}}$$

$$\boxed{2\log x + \tfrac{1}{2}\log(x+5)}$$

$$\log_8 \frac{x^2+3x-18}{x^2-4x+3} = \log_8 \frac{(x-3)(x+6)}{(x-3)(x-1)} \quad \oplus \ \ominus$$

$$\log_8(x-3) + \log_8(x+6) - \log_8(x-3) - \log_8(x-1)$$

$$\log_8(x+6) - \log_8(x-1)$$

$$\log_8 \frac{x+6}{x-1} = 2 \qquad 8^2 = \frac{x+6}{x-1}$$

$$(x-1)64 = \frac{x+6}{x-1}(x-1)$$

$$64(x-1) = x+6$$

$$64x - 64 = x + 6$$

$$-x \qquad -x$$

$$63x - 64 = 6$$

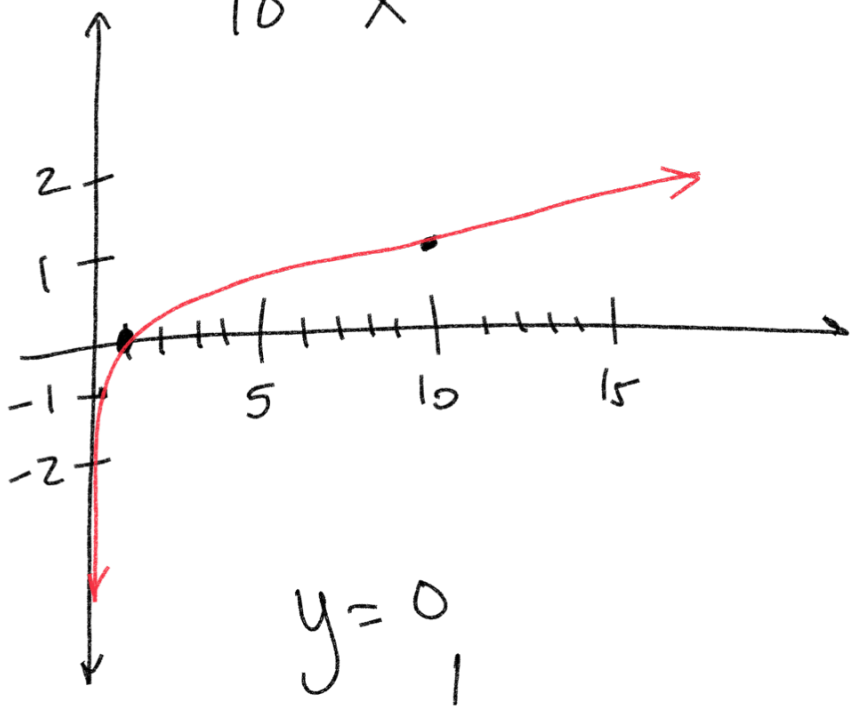
$$+64 \quad +64$$

$$\frac{63x}{63} = \frac{70}{63}$$

$$x = \frac{70 \div 7}{63 \div 7} = \boxed{\frac{10}{9}}$$

$y = \log_{10} x$

$10^y = x$



$x = 1 \quad y = 0$

$10^0 = 1$

$x = 10 \quad y = 1$

$10^1 = 10$

$x = \frac{1}{10} \quad 10^{-1} = \frac{1}{10}$

$y = -1$

$y = 0$

$\frac{1}{\infty}$

$\log(x+3) - 2$

3 left

down 2