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SECTION 1.6 INVERSE LOGS & TRIG. FUNCTIONS

(33) a) $\log_5 125 = \boxed{3}$

b) $\log_3 \frac{1}{27} = \log_3 1 - \log_3 27 = 0 - 3 = \boxed{-3}$

(35) a) $\log_2 6 - \log_2 15 + \log_2 20 = \log_2\left(\frac{\cancel{6}^{2}}{\cancel{15}_{\cancel{5}}} \cdot \cancel{20}^{4}\right) = \log_2 8 = \boxed{3}$

b) $\log_3 100 - \log_3 18 - \log_3 50 = \log_3\left(\frac{\cancel{100}^{2}}{\cancel{18}_{9}} \cdot \frac{1}{\cancel{50}}\right) = \log_3\left(\frac{1}{9}\right)$

$= \log_3 1 - \log_3 9$

$= 0 - 2 = \boxed{-2}$

(47) SOLVE FOR X

a) $2\ln x = 1$

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

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

(a) $\boxed{x = \sqrt{e}}$

b) $e^{-x} = 5$

$\ln e^{-x} = \ln 5$

$-x \ln e = \ln 5$

$-x = \ln 5$

$\boxed{x = -\ln 5}$

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(48) a) $e^{2x+3} - 7 = 0$

$\ln e^{2x+3} = \ln 7$

$(2x+3)(\cancel{\ln e})^{1} = \ln 7$

$2x+3 = \ln 7$

$2x = \ln 7 - 3$

(a) $\boxed{x = \dfrac{\ln 7 - 3}{2}}$

b) $\ln(5-2x) = -3$

$e^{\ln(5-2x)} = e^{-3}$

$5 - 2x = e^{-3}$

$-2x = e^{-3} - 5$

$\boxed{x = \dfrac{5 - e^{-3}}{2}}$

(57) $f(t) = n = 100 \cdot 2^{t/3}$

$\dfrac{n}{100} = 2^{t/3}$

$\log_2 \dfrac{n}{100} = \log_2 2^{t/3}$

$\log_2 \dfrac{n}{100} = \dfrac{t}{3}$

$t = 3 \log_2 \dfrac{n}{100}$

$t = 3\left(\dfrac{\ln \frac{n}{100}}{\ln 2}\right)$

(a) $f(n) = t = 3\left(\dfrac{\ln n - \ln 100}{\ln 2}\right)$

$f(n)$ REPRESENTS THE FUNCTION OF TIME REQUIRED FOR THE BACTERIA TO GROW TO SIZE n

(b) $f(n) = 3\left(\dfrac{\ln 50000 - \ln 100}{\ln 2}\right) \approx \boxed{26.9 \text{ hours}}$

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(59) FIND EXACT VALUE

a) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = \boxed{\frac{\pi}{3}}$

b) $\cos^{-1}(-1) = \boxed{\pi}$

(63) a) $\tan(\arctan 10) = \boxed{10}$

b) $\sin^{-1}\left(\sin \frac{7\pi}{3}\right) = \boxed{\frac{\pi}{3}}$

REMEMBER $\sin^{-1}$ IS ONLY DEFINED

$\frac{-\pi}{2} \leq x \leq \frac{\pi}{2}$

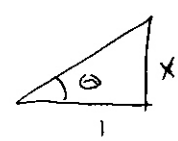
(67) $\sin(\tan^{-1} x) = \sin\theta$

$= \frac{x}{\sqrt{x^2+1}}$

$\boxed{\sin(\tan^{-1}x) = \frac{x}{\sqrt{x^2+1}}}$

$\tan^{-1} x = \theta$

$\tan\theta = x$



$h^2 = x^2 + 1^2$

$h = \sqrt{x^2+1}$