(38) $\frac{3e^{2x}}{3} = \frac{48}{3}$

$e^{2x} = 16$

$\frac{\ln_e 16}{2} = \frac{2x}{2} = \frac{1}{2}\ln 16$

$= \ln 16^{1/2} = \ln 4$

(5)

$A = Pe^{rt}$

$10 = 5e^{rt}$

$2 = 1e^{rt}$

$2 = 1e^{.065t}$

$2 = e^{.065t}$

$\frac{\ln_e 2}{.065} = \frac{.065t}{.065}$

$10.66 = t$ yrs.

$$N = N_0(2)^{t/d}$$

(7) $\frac{12345}{1234} = \frac{1234(2)^{t/2.25}}{1234}$

$10.004 = 2^{t/2.25} = 10.004$

$\log_2 10.004 = \frac{t}{2.25}$

$2.25 \cdot 3.32 = \frac{t}{2.25} \cdot 2.25$

$t = 7.48$ hours.

(11) $A = P\left(1 + \frac{r}{n}\right)^{nt}$

$\frac{800}{500} = \frac{500\left(1 + \frac{.0875}{12}\right)^{12t}}{500}$

$\frac{8}{5} = (1.0073)^{12t}$

$\log_{1.0073} \frac{8}{5} = 12t$

$64.7 = 12t \rightarrow t = 5.39$ yrs.

$\frac{1.48}{100}$

③ a) $623280 = 311640\, e^{.0148t}$

$2 = e^{.0148t}$

b)

$\frac{(\ln 2)}{.0148} = \frac{.0148t}{.0148}$

2062

$46.83 = t$

$+2017$

$2063.83 \rightarrow \boxed{2064}$

Think about Graph:

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

$y = -\log\left(\frac{1}{3}(x-3)\right) + 2$

3

BASE 3 → make 3^x table

x	3^x
-1	$1/3$
0	1
1	3
2	9

flip →

PLOT

x	$\log_3 x$
$1/3$	-1
1	0
3	1
9	2

SOLVE

(1) (1/3) $2(3)^{3x+1} = 18$

(2) (15) $\log_{\sqrt[3]{2}} 32 = x$ $\quad \sqrt[3]{2}^{x} = 32$ $\quad 2^{\frac{x}{3}} = 32$

(3) (64) $\log_{\frac{1}{16}} x = -\frac{3}{2}$ $\quad \left(\frac{1}{16}\right)^{-\frac{3}{2}} =$

(4) (25) $\log_{\sqrt{x}} 125 = 3$

(5) $\frac{3}{2} \cdot \frac{2}{3} \ln(x-5) = 4 \cdot \frac{3}{2}$ $\quad x = e^6 + 5$

(6) (5) $\log(x+4) - \log 45 = -\log x$

(7) (3) $\log_2(x+3) - 1 = \log_2 x$

(8) $4^{2\log_4 5 - \log_4 5} = 5$

Graphs
Inverse eqn.

Applications → only $A = Pe^{rt}$ memorize

Solve.

(1)(1) $2(3)^{3x+1} = 18 \rightarrow 3^{3x+1} = 9 \rightarrow 3x+1 = 2$

$3x = 1$

$\boxed{x = \frac{1}{3}}$

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

(2)(3) $\log_{\sqrt[3]{2}} 32 = x$

$\sqrt[3]{2}^{x} = 32$

$2^{\frac{x}{3}} = 2^{5}$

$\boxed{x = 15}$

(4) $\log_{\frac{1}{16}} x = -\frac{3}{2}$

(3)

$\boxed{x = 64}$

(4)(5) $\log_{\sqrt{x}} 125 = 3$

$\boxed{x = 25}$

(6) $25^{x^2} = \left(\frac{1}{5}\right)^{5x} \cdot \frac{625}{\sqrt{25}}$

$5^{2x^2} = 5^{-5x} \cdot 5^{3}$

$2x^2 + 5x - 3 = 0$

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

$\boxed{x = \frac{1}{2}, -3}$

(5)(7) $\frac{2}{3}\ln(x-5) = 4 \cdot \frac{3}{2}$

$\ln(x-5) = 6$

$e^{6} = x-5$

$\boxed{e^{6}+5 = x}$

(6)(8) $\log(x+4) - \log 45 = -\log x$

$\boxed{x = 5}$ ~~-9~~

(7)(9) $\log_2(x+3) - 1 = \log_2 x$

$\boxed{x = 3}$

(8)(10) $\ln 2x = 2 - 2\ln 3$

$\ln 2x + \ln 3^2 = 2$

$\ln 18x = 2$

$e^2 = 18x$

$\boxed{\frac{e^2}{18} = x}$

(11) $4^{2\log_4 5 - \log_4 5} = 5$

(12) $16^{\log_4 7} = 49$