A) $16^x = 2$

$(2^4)^x = 2$

$2^{4x} = 2^1$

$4x = 1$

$x = \frac{1}{4}$

B) $5^{w+5} = 625$

$5^{w+5} = 5^4$

$w+5 = 4$

$-5 \quad -5$

$w = -1$

C) $11^{3y-5} = 14641$

$11^{3y-5} = 11^4$

$3y - 5 = 4$

$3y = 9$

$y = 3$

A) $\ln(2x \cdot e^x)$

$\ln(2x) + \ln e^x$

$\ln 2 + \ln x + x \ln e$ $\quad \ln e = 1$

$\boxed{\ln 2 + \ln x + x}$

B) $\log\left[\dfrac{x^2(x^2+1)^{1/2}}{(x+3)^4}\right]$

$\log\left[x^2(x^2+1)^{1/2}\right] - \log(x+3)^4$

$\log(x^2) + \log(x^2+1)^{1/2} - \log(x+3)^4$

$\boxed{2\log x + \frac{1}{2}\log(x^2+1) - 4\log(x+3)}$

C) $\ln\left(x \cdot (x^2-1)^{1/2}\right)$

$\ln x + \ln(x^2-1)^{1/2}$

$\ln x + \frac{1}{2}\ln(x^2-1)$

$\ln x + \frac{1}{2}\left[\ln((x-1)(x+1))\right]$

$\ln x + \frac{1}{2}\left[\ln(x-1) + \ln(x+1)\right]$

$\boxed{\ln x + \frac{1}{2}\ln(x-1) + \frac{1}{2}\ln(x+1)}$

D) $\log\left(\dfrac{x^3+2x^2+x}{x^2-3x-4}\right)$

$\log(x^3+2x^2+x) - \log(x^2-3x-4)$

$\log(x(x^2+2x+1)) - \log[(x-4)(x+1)]$

$\log x + \log(x^2+2x+1) - (\log(x-4) + \log(x+1))$

$\log x + \log(x+1)^2 - \log(x-4) - \log(x+1)$

$\log x + 2\log(x+1) - \log(x-4) - \log(x+1)$

$\boxed{\log x - \log(x-4) + \log(x+1)}$

A) $2\log y + \log(y+1) - 5\log(y+4)$

$\log y^2 + \log(y+1) - \log(y+4)^5$

$\log(y^2(y+1)) - \log(y+4)^5$

$\log\left[\frac{y^2(y+1)}{(y+4)^5}\right]$

B) $\ln(x-1) - 2[\ln(x+5) + \ln x]$

$\ln(x-1) - 2\ln(x+5) - 2\ln x$

$\ln(x-1) - \ln(x+5)^2 - \ln x^2$

$\ln\left(\frac{x-1}{(x+5)^2}\right) - \ln x^2$

$\ln\left(\frac{x-1}{(x+5)^2} \div x^2\right)$

$\ln\left(\frac{x-1}{(x+5)^2} \cdot \frac{1}{x^2}\right)$

$\ln\left(\frac{x-1}{(x+5)^2 x^2}\right)$

C) $\ln(a+b) - 3\ln c + \ln(a+b) - \ln(a-b)$

$2\ln(a+b) - 3\ln c - \ln(a-b)$

$\ln(a+b)^2 - \ln c^3 - \ln(a-b)$

$\ln\left(\frac{(a+b)^2}{c^3}\right) - \ln(a-b)$

$\ln\left(\frac{(a+b)^2}{c^3(a-b)}\right)$

D) $2(\log_5 x + 2\log_5 y - 3\log_5 z)$

$2\log_5 x + 4\log_5 y - 6\log_5 z$

$\log_5 x^2 + \log_5 y^4 - \log_5 z^6$

$\log_5(x^2 y^4) - \log_5 z^6$

$\log_5\left(\frac{x^2 y^4}{z^6}\right)$

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

interest continuously compounded $A = Pe^{rt}$

5 yrs.

$2000 deposited at 6% compounded:

A) semi-annually $A = 2000\left(1+\frac{.06}{2}\right)^{2(5)}$

$A = \$2687.83$

B) quarterly $A = 2000\left(1+\frac{.06}{4}\right)^{4(5)}$

$A = \$2693.71$

C) Monthly $A = 2000\left(1+\frac{.06}{12}\right)^{12(5)}$

$A = \$2697.70$

D) Daily $A = 2000\left(1+\frac{.06}{365}\right)^{365(5)}$

$A = \$2699.65$

E) Continuously $A = 2000e^{.06(5)}$

$A = \$2699.72$

A) $f(x) = 2x - 1$ $\quad f^{-1}(x) = \frac{x+1}{2}$

$y = 2x - 1$

$x = 2y - 1$
$+1 \quad +1$

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

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

f: DOMAIN: $(-\infty, \infty)$ RANGE: $(-\infty, \infty)$

f^{-1}: DOMAIN: $(-\infty, \infty)$ RANGE: $(-\infty, \infty)$

B) $g(x) = x^3 + 1$ $\quad g^{-1}(x) = \sqrt[3]{x-1}$

$y = x^3 + 1$

$x = y^3 + 1$
$-1 \quad -1$

$\sqrt[3]{x-1} = \sqrt[3]{y^3}$

$\sqrt[3]{x-1} = y$

g: DOMAIN: $(-\infty, \infty)$ RANGE: $(-\infty, \infty)$

g^{-1}: DOMAIN: $(-\infty, \infty)$ RANGE: $(-\infty, \infty)$

C) $k(x) = \frac{1}{x-3}$ $\quad k^{-1}(x) = \frac{3x+1}{x}$

$y = \frac{1}{x-3}$

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

$xy - 3x = 1$
$+3x \quad +3x$

$xy = \frac{3x+1}{x}$

$y = \frac{3x+1}{x}$

$x - 3 = 0$
$+3 \quad +3$

$x = 3$

k: DOMAIN: $(-\infty, 3) \cup (3, \infty)$ RANGE: $(-\infty, 0) \cup (0, \infty)$

k^{-1}: DOMAIN: $(-\infty, 0) \cup (0, \infty)$ RANGE: $(-\infty, 3) \cup (3, \infty)$

D) $h(x) = \frac{x}{5-2x}$

$y = \frac{x}{5-2x}$

$(5-2y)x = \left(\frac{y}{5-2y}\right)(5-2y)$

$5x - 2xy = y$

$+2xy \quad\quad +2xy$

$5x = y + 2xy$

$5x = y(1+2x)$

$\frac{5x}{1+2x} = y$

$h^{-1}(x) = \frac{5x}{1+2x}$

$1+2x=0$

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

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

h

DOMAIN: $(-\infty, \frac{5}{2}) \cup (\frac{5}{2}, \infty)$

RANGE: $(-\infty, \frac{-1}{2}) \cup (\frac{-1}{2}, \infty)$

h^{-1}

DOMAIN: $(-\infty, \frac{-1}{2}) \cup (\frac{-1}{2}, \infty)$

RANGE: $(-\infty, \frac{5}{2}) \cup (\frac{5}{2}, \infty)$

$5-2x=0$

$+2x \quad +2x$

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

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

A) Starting Pop.: 160 rabbits, doubles every year

$R(t) = 160(2)^t$

B) $R(11) = 160(2)^{11}$

$= 327,680$ rabbits

8% interest compounded monthly

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

$A = 3500\left(1 + \frac{.08}{12}\right)^{12(12)}$

$= 3500(1.00666\ldots)^{144}$

$= 3500(2.6033\ldots)$

$A = \$9,111.86$

B) \$10,000 in 20 years

$10000 = P\left(1 + \frac{.08}{12}\right)^{12(20)}$

$10000 = P(1.006666)^{240}$

$10000 = P(4.9268\ldots)$

$\frac{10000}{(4.9268\ldots)} = \frac{P(4.9268\ldots)}{(4.9268\ldots)}$

$\$2029.71 = P$

$m(t) = 12e^{-.015t}$

A) find m when $t = 0$

$m = 12e^{-.015(0)}$

$= 12(e^{0})1$

$m = 12$ kg

B) find m when $t = 45$

$m = 12e^{-.015(45)}$

$= 12e^{-.675}$

$m = 6.1098\ldots$

6.11 kg