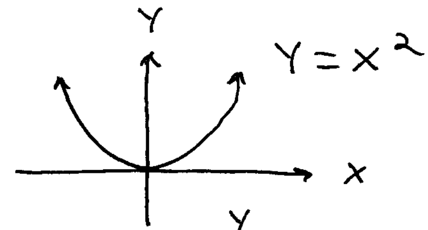
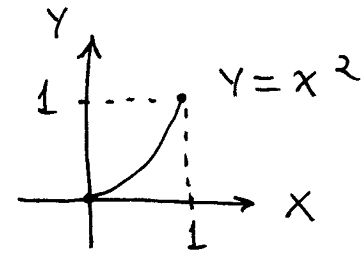
Section 1.2

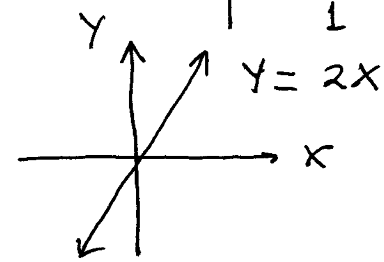
1.) $f(x) = x^2$;
Range : $y \geq 0$



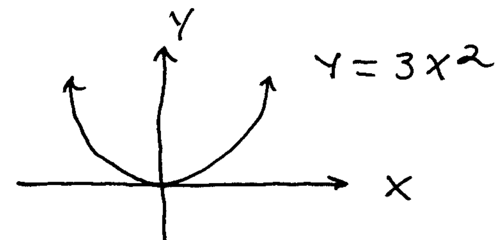
2.) $f(x) = x^2$ for $0 \leq x \leq 1$;
Range : $0 \leq y \leq 1$



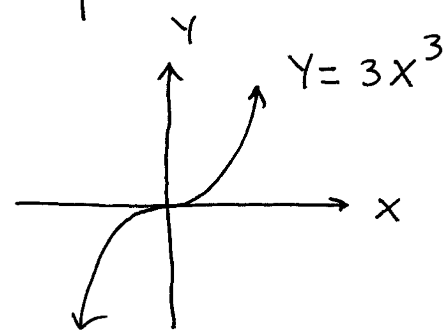
7.) $f(x) = 2x$ is **odd** ;
Show $f(-x) = -f(x)$:
$f(-x) = 2(-x)$
$= -2x = -f(x)$



8.) $f(x) = 3x^2$ is even ;
Show $f(-x) = f(x)$:
$f(-x) = 3(-x)^2 = 3x^2 = f(x)$



12.) $f(x) = 3x^3$ is odd ;
Show $f(-x) = -f(x)$:
$f(-x) = 3(-x)^3 = 3 \cdot (-x^3)$
$= -3x^3 = -f(x)$



16.) $f(x) = \frac{1}{x+1}$, $x \neq -1$ and $g(x) = 2x^2$

a.) $(f \circ g)(x) = f(g(x)) = f(2x^2) = \frac{1}{2x^2+1}$;
Domain : all x-values

b.) $(g \circ f)(x) = g(f(x)) = g\left(\frac{1}{x+1}\right) = 2 \cdot \left(\frac{1}{x+1}\right)^2$
$= \frac{2}{(x+1)^2}$; Domain : all $x \neq -1$

31.)

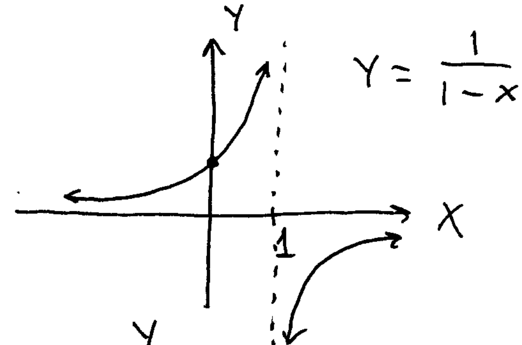
Dist	Time
1 m.	1 hr.
2 m.	2 hrs.
3 m.	3 hrs.

So distance $D = T$ where T is time in hours

33.) $f(x) = \dfrac{1}{1-x}$:

Domain : all $x \neq 1$

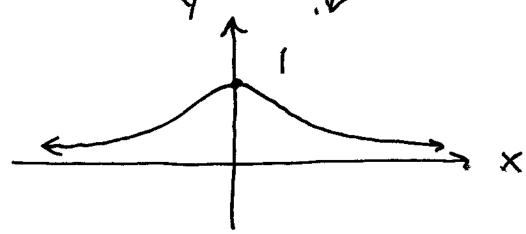
Range : all $Y \neq 0$



36.) $f(x) = \dfrac{1}{x^2+1}$:

Domain : all x-values

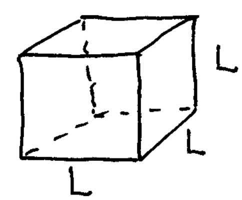
Range : $0 < Y \leq 1$



56.) $M = 0.35V \rightarrow M = \frac{35}{100}V$

$\rightarrow V = \frac{20}{7}M$; and $V = L^3$

$\rightarrow L = V^{1/3} = \left(\frac{20}{7}M\right)^{1/3}$; i.e., $L = \left(\frac{20}{7}M\right)^{1/3}$



58.) $N = 40 \cdot 2^t$

a.) If $t = 0$, then $N = 40 \cdot 2^0 = 40 \cdot 1 = 40$

b.) (Recall : $e^{\ln z} = z$)

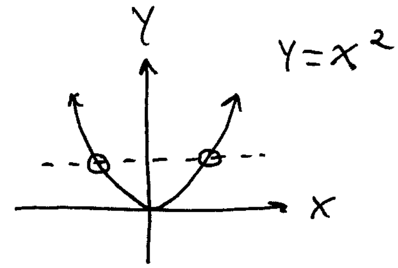
$N = 40 \cdot 2^t = 40 \cdot e^{\ln 2^t} = 40 \cdot e^{t \cdot \ln 2}$

c.) If $N = 1000$, then $1000 = 40 \cdot 2^t \rightarrow$

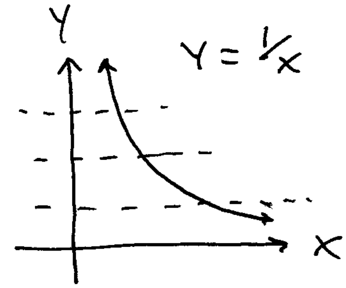
$25 = 2^t \rightarrow \ln 25 = \ln 2^t \rightarrow$

$\ln 25 = t \cdot \ln 2 \rightarrow t = \dfrac{\ln 25}{\ln 2} \approx 4.64$

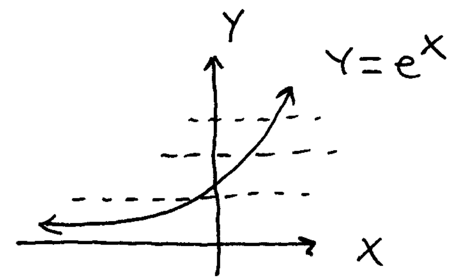
69.) b.) $f(x) = x^2$ is NOT 1-1 since it fails horizontal line test



c.) $f(x) = \frac{1}{x}$, $x > 0$ is 1-1 since it passes horizontal line test



d.) $f(x) = e^x$ is 1-1 since it passes horizontal line test



70.) a.) Let $f(x) = x^3 - 1$; show f is 1-1:

$f(x_1) = f(x_2) \rightarrow x_1^3 - 1 = x_2^3 - 1 \rightarrow x_1^3 = x_2^3 \rightarrow$

$(x_1^3)^{1/3} = (x_2^3)^{1/3} \rightarrow x_1 = x_2$;

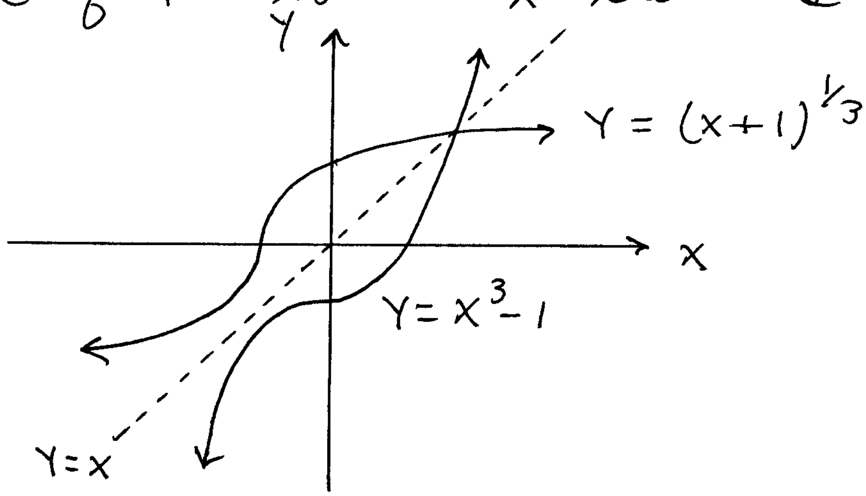
$Y = x^3 - 1 \rightarrow$ (switch variables) $x = Y^3 - 1$

$\rightarrow$ (solve for Y) $Y^3 = x + 1 \rightarrow$

$Y = (x+1)^{1/3} \rightarrow \underline{f^{-1}(x) = (x+1)^{1/3}}$ and

domain of f^{-1} is all x-values

b.)

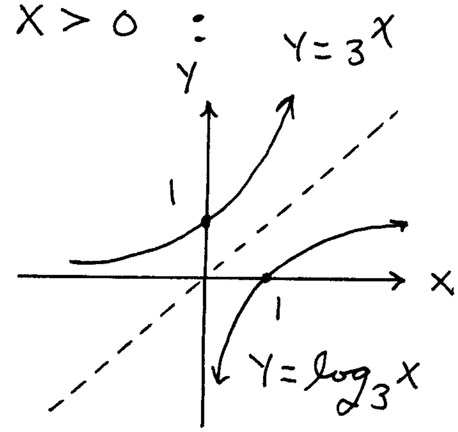


75) $Y = 3^X \rightarrow$ (switch variables)

$X = 3^Y \rightarrow$ (solve for Y)

$\log_3 X = \log_3 3^Y \rightarrow Y = \log_3 X \rightarrow f^{-1}(x) = \log_3 X$

and domain for f^{-1} is all $X > 0$:



81.) b.) $3^{4\log_3 X} = 3^{\log_3 X^4}$

$= X^4$

d.) $4^{-2\log_2 X} = 4^{\log_2 X^{-2}}$

$= (2^2)^{\log_2 X^{-2}} = 2^{2\log_2 X^{-2}}$

$= 2^{\log_2 X^{-4}} = X^{-4}$

e.) $2^{3\log_{1/2} X} = 2^{\log_{1/2} X^3} = \left(\frac{1}{\frac{1}{2}}\right)^{\log_{1/2} X^3}$

$= \dfrac{1^{\log_{1/2} X^3}}{\left(\frac{1}{2}\right)^{\log_{1/2} X^3}} = \dfrac{1}{X^3}$

82.) a.) $\log_4 16^X = \log_4 (4^2)^X = \log_4 4^{2X} = 2X$

d.) $\log_{1/2} 4^X = \log_{1/2} (2^2)^X = \log_{1/2} \left(\frac{1}{2^{-2}}\right)^X$

$= \log_{1/2} \left(\left(\frac{1}{2}\right)^{-2}\right)^X = \log_{1/2} \left(\frac{1}{2}\right)^{-2X} = -2X$

f.) $\log_3 9^{-X} = \log_3 (3^2)^{-X} = \log_3 3^{-2X} = -2X$

83.) c.) $\ln(x^2-1) - \ln(x+1) = \ln \frac{x^2-1}{x+1}$

$= \ln \frac{(x-1)\cancel{(x+1)}}{\cancel{x+1}} = \ln(x-1)$

84.) d.) $e^{-2\ln x} = e^{\ln x^{-2}} = x^{-2}$

99.) $f(x) = 4 \sin 2\pi x$;
amplitude $= 4$;
$0 \le 2\pi x \le 2\pi \longrightarrow 0 \le x \le 1$ so
period $= 1$.