Ch 12 Solutions.

(1) $(g\circ f)(3) = g(f(3))$
$= g(15+9) = g(24) = \frac{2}{24} = \frac{1}{12}$

(3) $(f\circ g)(x) = f(g(x))$
$= f(5x+1) = (5x+1)^2 + 6$
$= 25x^2 + 10x + 1 + 6 = 25x^2 + 10x + 7$

(5) No (6) yes

(7) Need to show
$(f\circ g)(x) = x$ and $(g\circ f)(x) = x$

$(f\circ g)(x) = f(g(x)) = \dfrac{-6 - \left[\frac{-6}{x+1}\right]}{x} = \dfrac{-6 + \frac{6}{x+1}}{x}$

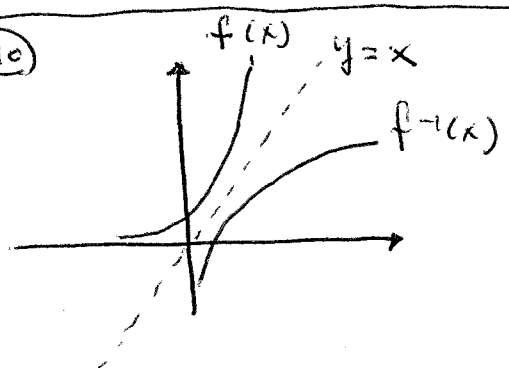
$= \dfrac{-6(x+1) + 6}{x(x+1)} \neq x$ NO!

(8) $(f\circ g)(x) = f(g(x)) = \dfrac{(-8x+4) - 4}{8}$
$= \dfrac{-8x}{8} = -x \neq x$ NO!

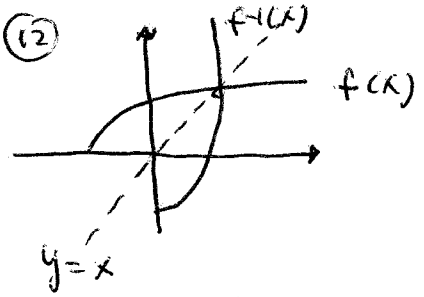
(9) $(f\circ g)(x) = f(g(x)) = \left[\sqrt[3]{x-7}\right]^3 + 7$
$= (x-7) + 7 = x$
$(g\circ f)(x) = g(f(x)) = \sqrt[3]{(x^3+7) - 7}$
$= \sqrt[3]{x^3+7-7} = \sqrt[3]{x^3} = x$

Yes

(10)



(12)



(13) $f(x) = x^3 - 4$
1. $y = x^3 - 4$.
2. $x = y^3 - 4$
3. $y^3 = x + 4 \Rightarrow y = \sqrt[3]{x+4}$
4. $f^{-1}(x) = \sqrt[3]{x+4}$

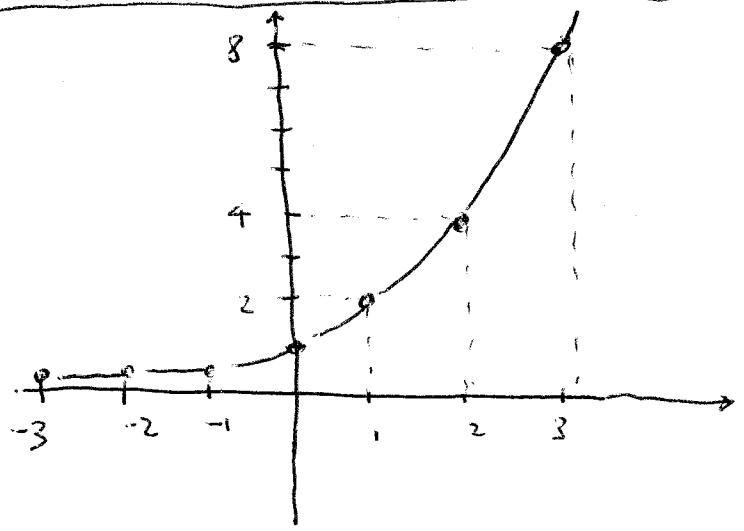
(15) $f(x) = x-10/x-6$
1. $y = x-10/x-6$
2. $x = y-10/y-6$
3. $y - 10 = xy - 6x \Rightarrow y(1-x) = 10 - 6x$
$\Rightarrow y = \dfrac{6x-10}{x-1}$
4. $f^{-1}(x) = \dfrac{6x-10}{x-1}$

(16) No (Fails horizontal line test)

(17) NO (")

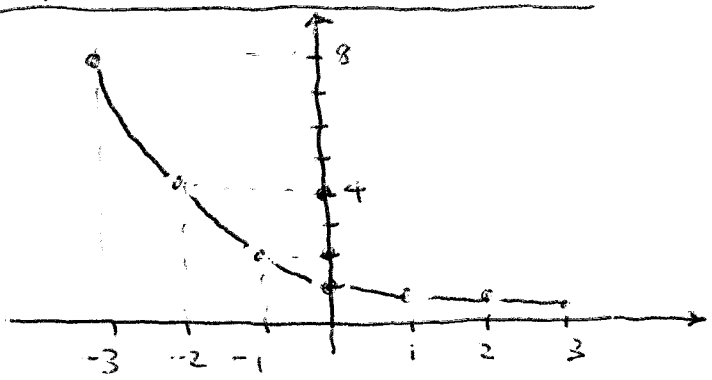
(19) $f(x) = 2^x$

x	-3	-2	-1	0	1	2	3
f(x)	1/8	1/4	1/2	1	2	4	8



(20) $f(x) = \left(\frac{1}{2}\right)^x$

x	-3	-2	-1	0	1	2	3
$f(x)$	8	4	2	1	1/2	1/4	1/8



(21) $4^x = 32^{(2x-2)} \Rightarrow (2^2)^x = (2^5)^{(2x-2)}$

$2^{2x} = 2^{10x-10} \Rightarrow 2x = 10x - 10 \Rightarrow 8x = 10$

$\Rightarrow x = 10/8 = 5/4$

(22) $3^{(6-2x)} = \frac{1}{27} = 3^{-3}$ you solve!

(24) $3 = \log_5 125$

(25) $\log_3 x + 4 = 7 \Rightarrow \log_3 x = 7 - 4 = 3$

$x = 3^3 = 27$

(26) $\frac{1}{2}\log_2 x + 8 = 7 \Rightarrow \frac{1}{2}\log_2 x = -1$

$\log_2 x = -2 \Rightarrow x = 2^{-2} = \frac{1}{2^2} = \frac{1}{4}$

(27) $41 = e^{3.714}$

(29) $\log_b m^3 p^5 - \log_b n^6 b^9$

$= \log_b m^3 + \log_b p^5 - \log_b n^6 - \log_b b^9$

$= 3\log_b m + 5\log_b p - 6\log_b n - 9$

(30) $\log_b \left(\frac{x^6 b^7}{y^8 z^{14}}\right)^{1/4}$

$= \log_b \left(\frac{x^{6/4} b^{7/4}}{y^{8/4} z^{14/4}}\right)$

$= \frac{6}{4}\log_b x + \frac{7}{4}\log_b b - \frac{8}{4}\log_b y - \frac{14}{4}\log_b z$

$= \frac{3}{2}\log_b x + \frac{7}{4} - 2\log_b y - \frac{7}{2}\log_b z$

(31) $\log_b x^5 - \log_b (\sqrt{x})^2 = \log_b \frac{x^5}{x} = \log_b x^4$

(32) $\log_b 5x + 2\log_b x - 2\log_b y$

$= \log_b 5x + \log_b x^2 - \log_b y^2$

$= \boxed{}$ you finish!

(35) $\ln \sqrt[4]{e} = \frac{1}{4}\ln e = ?$

(38) $D = 10 \log \frac{8.01 \times 10^{-7}}{10^{-16}} = ?$

(42) $4^x = 11 \Rightarrow \log 4^x = \log 11$

$x \log 4 = \log 11 \Rightarrow x = \log 11 / \log 4$

(43) $4^{(7-3x)} = \frac{1}{16} = 4^{-2} \Rightarrow 7 - 3x = -2$

(44) $\ln e^{-0.2t} = \ln 0.15$

$-0.2t = \ln 0.15 \Rightarrow t = \ln 0.15 / -0.2$

(45) $\log(x+3) + \log x = 1 \Rightarrow \log x(x+3) = 1$

$\Rightarrow x^2 + 3x = 10 \Rightarrow x^2 + 3x - 10 = 0$

you solve

(47) $\log \frac{(x+10)}{(x+4)} = \log x \Rightarrow \frac{x+10}{x+4} = x$ you solve

(48) $2P_0 = P_0 e^{0.079t} \Rightarrow 2 = e^{0.079t}$

$\ln 2 = 0.079t \Rightarrow t = \ln 2 / 0.079$

(49) $\frac{1}{2}(400) = 400 e^{-0.072t} \Rightarrow 200 = 400 e^{-0.072t}$

$\frac{1}{2} = e^{-0.072t} \Rightarrow \ln \frac{1}{2} = -0.072t$

$t = \ln(1/2) / -0.072$

(50) $\log_4 24.11 = \frac{\log 24.11}{\log 4}$