HW #1

pp 90-92: 1-6, 10, 15, 18, 21, 29, 30, 37-40 all, 55, 56, 61, 79, 83, 89, 91, 92, 93

1) inverse
2) f^{-1}
3) range, domain
4) $y=x$
5) one-to-one
6) horizontal
10) $f(x)=\frac{x-3}{2}$

$f^{-1}(x)=2x+3$

15) $f(x)=\frac{x-9}{4}$ $g(x)=4x+9$

$f(g(x))\ \frac{4x+9-9}{4}$

$\frac{4x}{4}$

x ✓

$g(f(x))=4\left(\frac{x-9}{4}\right)+9$

$x-9+9$

✓ $=x$

18) $f(x)=x^3+5$ $g(x)=\sqrt[3]{x-5}$

$\left(\sqrt[3]{x-5}\right)^3+5$

$x-5+5$

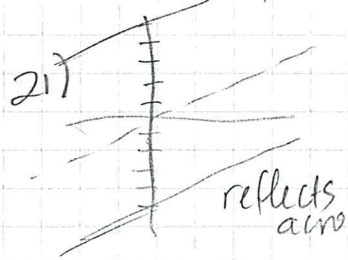
x

$\sqrt[3]{x^3+5-5}$

$\sqrt[3]{x^3}$

x

21)



$y=x-5$

$x=y-5$

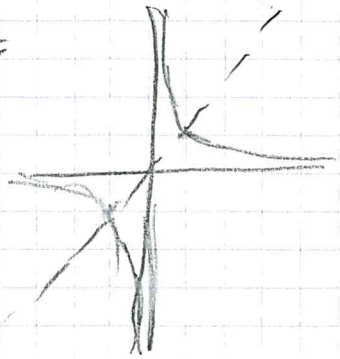
$x+5=y$

reflects across $y=x$

29) $f(x)=\frac{1}{x}$ $g(x)=\frac{1}{x}$

$f(g(x))=\frac{1}{\frac{1}{x}}=x$

$g(f(x))=\frac{1}{\frac{1}{x}}=x$



30) $f(x)=\frac{1}{1+x}$ $x\geq 0$

$g(x)=\frac{1-x}{x}$ $(0<x\leq 1)$

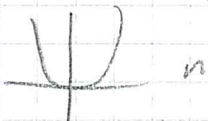
$g(f(x))=\frac{1-\frac{1}{1+x}}{\frac{1}{1+x}}=\frac{\frac{1+x-1}{1+x}}{\frac{1}{1+x}}=\frac{x}{1+x}\cdot\frac{1+x}{1}$

$=x$

$g(f(x))=\frac{1-\left(\frac{1}{1+x}\right)}{\frac{1}{1+x}}$ Same

37) yes 38) no 39) no 40) yes

55) $f(x)=x^4$



no inv

58) $f(x)=3x+5$ yes

$y=3x+5$

$x=3y+5$

$\frac{x-5}{3}=\frac{3y}{3}$

$y=\frac{x-5}{3}$

$(x)_{1-}f$

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

$x=y^3$

$g(x)=x^3$

$f(x)=\frac{1}{2}x-3$

$(1)_{1-}f$

$\left(1\right)_{1-}\left(g_{1-}f\right)$

d r

61) $f(x) = (x+3)^2$ $x \geq -3$ $y \geq 0$ $[0, \infty)$

$x = (y+3)^2$

$\sqrt{x} = y+3$

$\sqrt{x} - 3 = y$ if $y \geq 0$

79) $f^{-1}(g^{-1}(1)) =$

$g(x) = x^3$ $\quad x = y^3$

$f(x) = \frac{1}{8}x - 3$ $\quad y = \sqrt[3]{x} = \sqrt[3]{1} = 1$

$f^{-1}(x) = (x+3)\,8$

$(1+3)\cdot 8 = \boxed{32}$

83) $(f \circ g)^{-1}$

$f(g(x)) =$

$f\left(\frac{x^3}{8}\right) - 3$

$y = \frac{x^3}{8} - 3$

$x = \frac{y^3}{8} - 3$

$\sqrt[3]{8(x+3)} = \sqrt[3]{y^3}$

$2\sqrt[3]{x+3} = y$

89) $f(x) = 10 + .75x$

$x = 10 + .75y$

$\frac{x-10}{.75} = \frac{.75y}{.75}$

$f^{-1}(x) = \frac{x-10}{.75}$

x = hourly wage

y = # of units

91) False

92) True

93)

x	1	1.5	2	6	7
$f(x)$	1	1.5	2	6	7

x	1	1.5	2	6	7
$f^{-1}(x)$	1	2	3	4	6