Test 3 Key

① $g(-2) = (-2)^2 + 9 = 13$ $\quad f(-2) = \frac{-2-6}{-2} = 4$

$f(13) = \frac{13-6}{13} = \frac{7}{13}$ $\quad g(4) = 4^2 + 9 = 25$

② a) $\dfrac{\frac{x+2}{x-3} - 4}{\frac{x+2}{x-3} + 7} \cdot \dfrac{x-3}{x-3} = \dfrac{x+2-4(x-3)}{x+2+7(x-3)}$

$= \dfrac{x+2-4x+12}{x+2+7x-21} = \dfrac{14-3x}{8x-19}$

$D = \{x \mid x \neq 3, 19/8\}$

b) $\dfrac{\frac{x-4}{x+7} + 2}{\frac{x-4}{x+7} - 3} \cdot \dfrac{x+7}{x+7} = \dfrac{x-4+2(x+7)}{x-4-3(x+7)}$

$= \dfrac{x-4+2x+14}{x-4-3x-21} = \dfrac{3x+10}{-2x-25}$

$D = \{x \mid x \neq -7, -\frac{25}{2}\}$

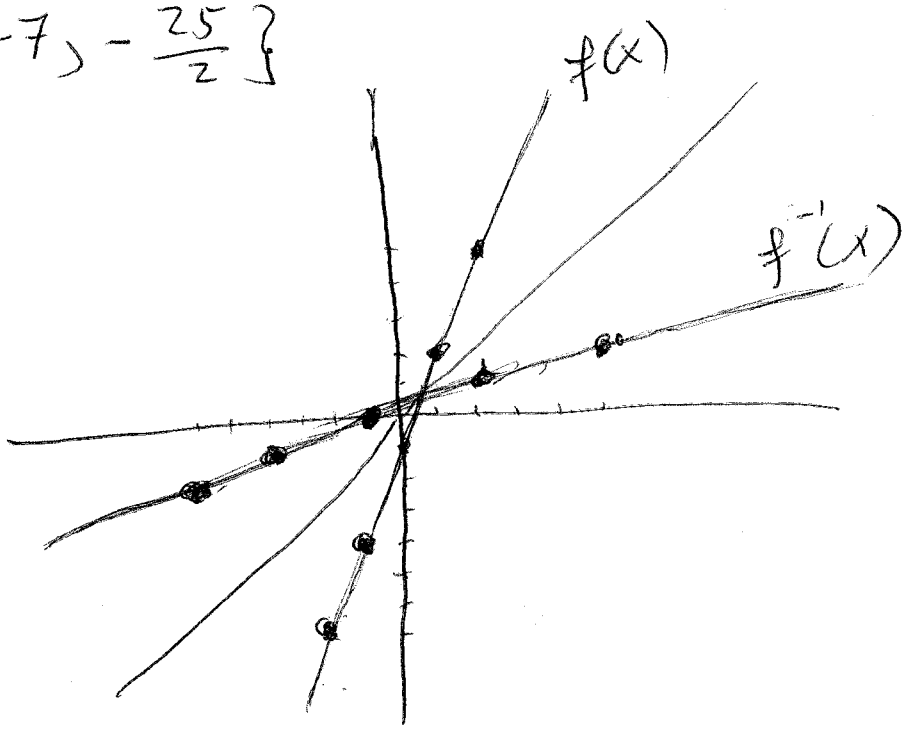
③ a) $x = 3y - 1$

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

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

x	$f(x)$
-2	-7
-1	-4
0	-1
1	2
2	5

x	$f^{-1}(x)$
-7	-2
-4	-1
-1	0
2	1
5	2



(4) It's exponential. $f(x) = 6(5)^x$

(5) $10^{2-x} = \frac{13}{2}$

$2 - x = \log \frac{13}{2}$

$x = 2 - \log \frac{13}{2}$

(6) a) $w(72) = 49 + 2.3(72 - 61)$

$= 74.3$ kg

b) $w - 49 = 2.3(h - 61)$

$\frac{w - 49}{2.3} = h - 61$

$h = \frac{w - 49}{2.3} + 61$

c) $h(80) = \frac{80 - 49}{2.3} + 61$

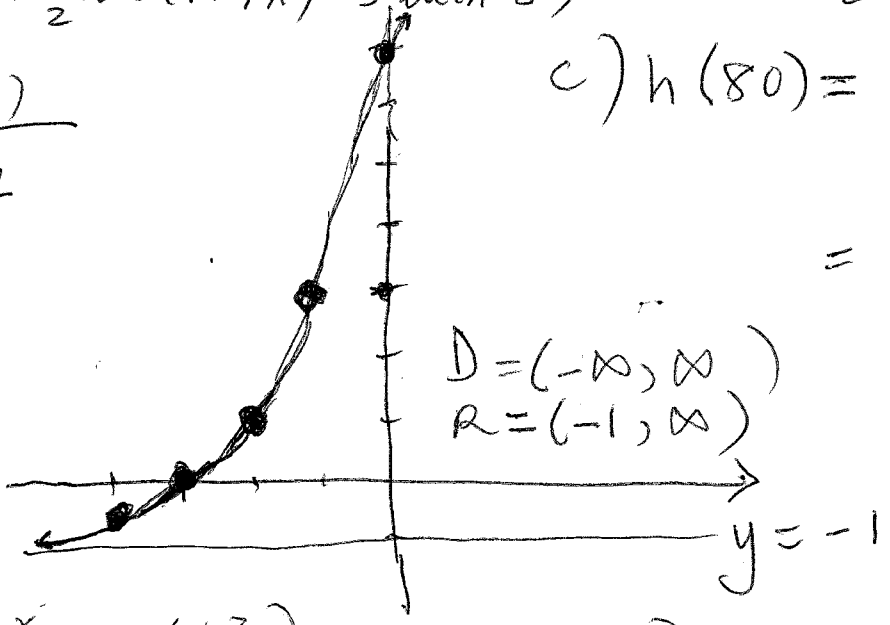
$= 74$ in

(7)

$\ln 2 + \ln x + \frac{1}{2}\ln(1 + 7x) - 5\ln(x - 8)$

(8)

x	$g(x)$
-4	$-1/2$
-3	0
-2	1
-1	3
0	7



(9) $\ln\left(\frac{x}{x-3} \cdot \frac{x+3}{x}\right) - \ln(x^2 - 9)$

$= \ln\left(\frac{\frac{x+3}{x-3}}{(x+3)(x-3)}\right) = \ln \frac{x+3}{(x+3)(x-3)^2} = \ln(x-3)^{-2}$

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

(10) $(1 - 9x)\ln 5 = x \ln 4$

$\ln 5 - 9x \ln 5 = x \ln 4$

$\ln 5 = 9x \ln 5 + x \ln 4$

$x = \frac{\ln 5}{9\ln 5 + \ln 4} = 0.101$

(11) $\frac{331}{760} = \frac{760e^{-0.145h}}{760}$

$\ln\frac{331}{760} = -0.145h \quad .50\ h = \frac{\ln\frac{331}{760}}{-0.145} \approx 5.73\text{km}$

(12) $399 = 280(1.012)^{t-1995}$

$\frac{399}{280} = (1.012)^{t-1995}$

$\ln\frac{399}{280} = (t-1995)\ln 1.012$

$t = \frac{\ln\frac{399}{280}}{\ln 1.012} + 1995 \approx 2025$

(13) $-2(x-2y+3z=11)$

add $\begin{cases} -2x+4y-6z=-22 \\ 2x+y+z=2 \end{cases}$

$\frac{5y-5z=-20}{5} \Rightarrow y-z=-4$

$y=z-4$

$3(x-2y+3z=11)$

$3x-6y+9z=33$

$-3x+2y-2z=-14$

$-4y+7z=19$

$-4(z-4)+7z=19$

$-4z+16+7z=19$

$3z=3$

$z=1$

$y=1-4=-3$

$x-2y+3z=11$

$x-2(-3)+3(1)=11$

$x+9=11$

$x=2$

$(2,-3,1)$