1a) $g(x) = \frac{2}{x+3}$

$g(1) = \frac{2}{1+3} = \frac{2}{4} = \frac{1}{2}$

$f(x) = 3x + 4$

$f(\frac{1}{2}) = 3(\frac{1}{2}) + 4$

$= \frac{11}{2}$

b) $gf(x) = \frac{2}{3x+4+3}$

$= \frac{2}{3x+7}$

$\frac{2}{3x+7} = 6$

$2 = 6(3x+7)$

$2 = 18x + 42$

$-40 = 18x$

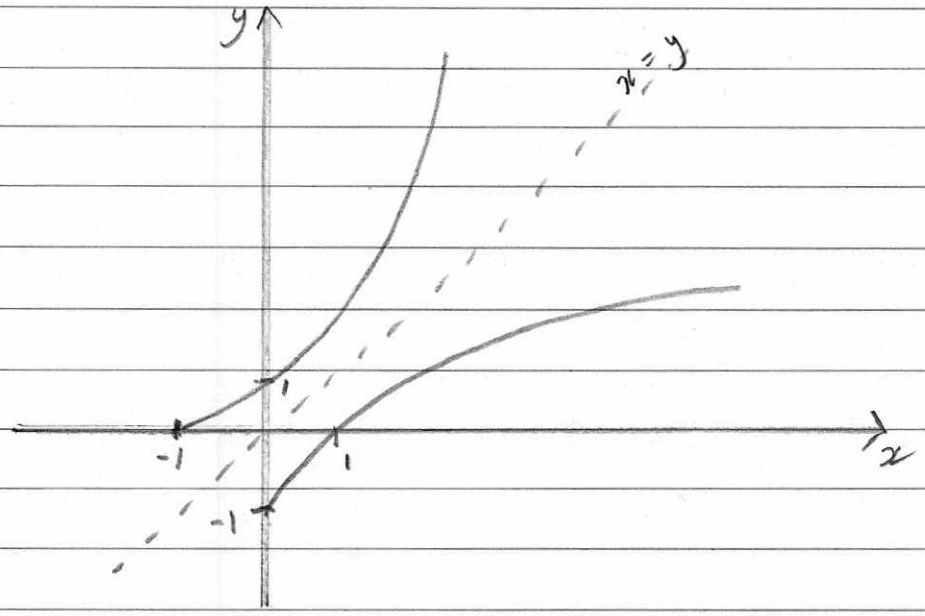
$x = \frac{-40}{18} = \frac{-20}{9}$

2a) $f(x) = x^2 + 2x + 1$

$= (x+1)^2$

min point at $(-1, 0)$ $\therefore$ $f(x) \geq 0$

b)



c) $y = x^2 + 2x + 1$

$y = (x+1)^2$

$x = (y+1)^2$

$\sqrt{x} = y + 1$

$y = \sqrt{x} - 1$

$f^{-1}(x) = \sqrt{x} - 1$ $\quad x \geq 0$

3a/ $f(x) = 2 + \ln(2x-1)$

$f(1) = 2 + \ln(2(1)-1)$

$= 2 + \ln 1$

$= 2$

$f(2) = 2 + \ln(2(2)-1)$

$= \underline{2 + \ln 3}$

b/ $y = 2 + \ln(2x-1)$

$x = 2 + \ln(2y-1)$

$x - 2 = \ln(2y-1)$

$e^{x-2} = 2y - 1$

$e^{x-2} + 1 = 2y$

$y = \dfrac{e^{x-2}+1}{2}$

$f^{-1}(x) = \dfrac{e^{x-2}+1}{2}$

4a/ $f(x) > 0$

b/ $gf(x) = 2x + \ln e^x$

$= 2x + x$

$= 3x$

c/ $gf(x) \in \mathbb{R}$

5a/ $f(x) \in \mathbb{R} \qquad f(x) \neq 0$

b/ $y = \dfrac{1}{x+2}$

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

$xy + 2x = 1$

$xy = 1 - 2x$

$y = \dfrac{1-2x}{x}$

$f^{-1}(x) = \dfrac{1-2x}{x} \qquad x \in \mathbb{R},\ x \neq 0$

c/ $fg(x) = \dfrac{1}{x^2 - 5 + 2}$

$= \dfrac{1}{x^2 - 3}$

$\dfrac{1}{2} = \dfrac{1}{x^2 - 3}$

$2 = x^2 - 3$

$5 = x^2$

$x = \pm\sqrt{5}$

6a) $f(x) = x^2 + 4x + 1$

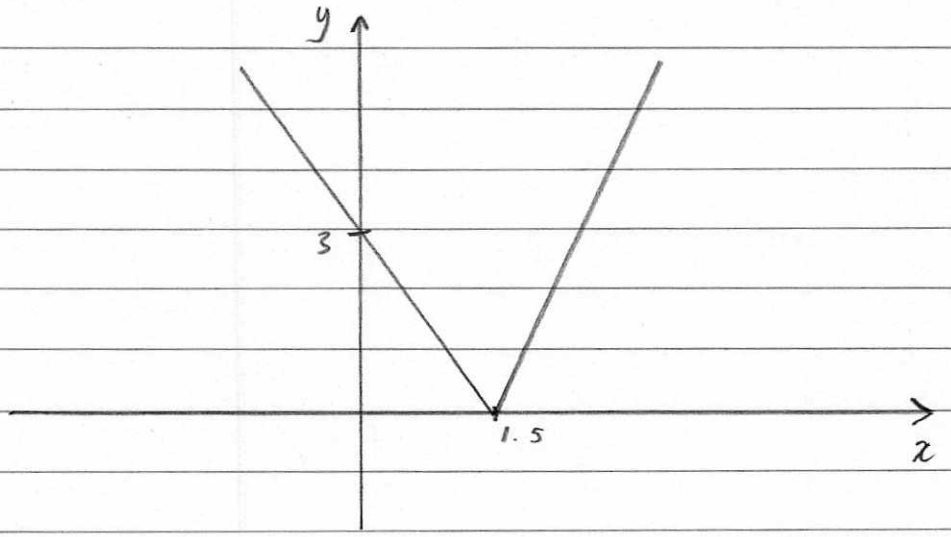
$= (x+2)^2 - 4 + 1$

$= (x+2)^2 - 3$

Min point : $(2, -3)$ $\quad f(x) \geq -3$

b/ It is a many to one function. (many to one functions do not have an inverse)

7a/



b/ $2x - 3 < 9$ $\quad -(2x-3) < 9$

$2x < 12$ $\quad -2x + 3 < 9$

$x < 6$ $\quad -2x < 6$

$x > -3$

$-3 < x < 6$

c/ $2x - 3 < x + 1$ $\quad -(2x-3) < x + 1$

$x - 3 < 1$ $\quad -2x + 3 < x + 1$

$x < 4$ $\quad 3 < 3x + 1$

$2 < 3x$

~~$x <$~~ $x > \frac{2}{3}$

$\frac{2}{3} < x < 4$

8a) $g(x) = \frac{3}{x-2}$

$g(3) = \frac{3}{3-2} = \underline{\underline{3}}$

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

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

$= \underline{\underline{\ln 7}}$

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

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

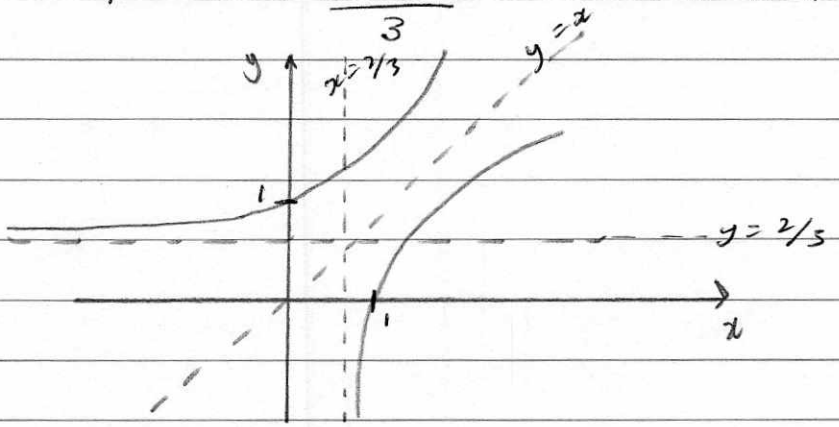
$e^x = 3y - 2$

$e^x + 2 = 3y$

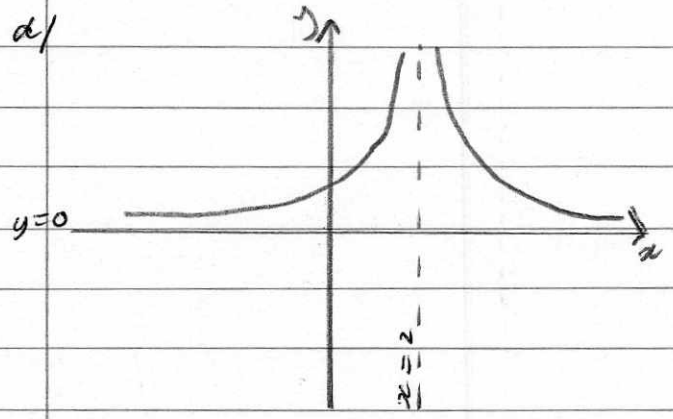
$y = \frac{e^x + 2}{3}$

$f^{-1}(x) = \frac{e^x + 2}{3}$ $\quad x \in \mathbb{R}$

c)



d)



e) $\frac{3}{x-2} = 4$ $\qquad \frac{-3}{x-2} = 4$

$3 = 4x - 8$ $\qquad -3 = 4x - 8$

$11 = 4x$ $\qquad 5 = 4x$

$x = \frac{11}{4}$ $\qquad x = \frac{5}{4}$