

1a)

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

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

$$f(x) = 3x + 4$$

$$\begin{aligned} f\left(\frac{1}{2}\right) &= 3\left(\frac{1}{2}\right) + 4 \\ &= \frac{11}{2} \end{aligned}$$

b)

$$\begin{aligned} gf(x) &= \frac{2}{3x+4+3} \\ &= \frac{2}{3x+7} \end{aligned}$$

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

$$2 = 6(3x+7)$$

$$2 = 18x + 42$$

$$-40 = 18x$$

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

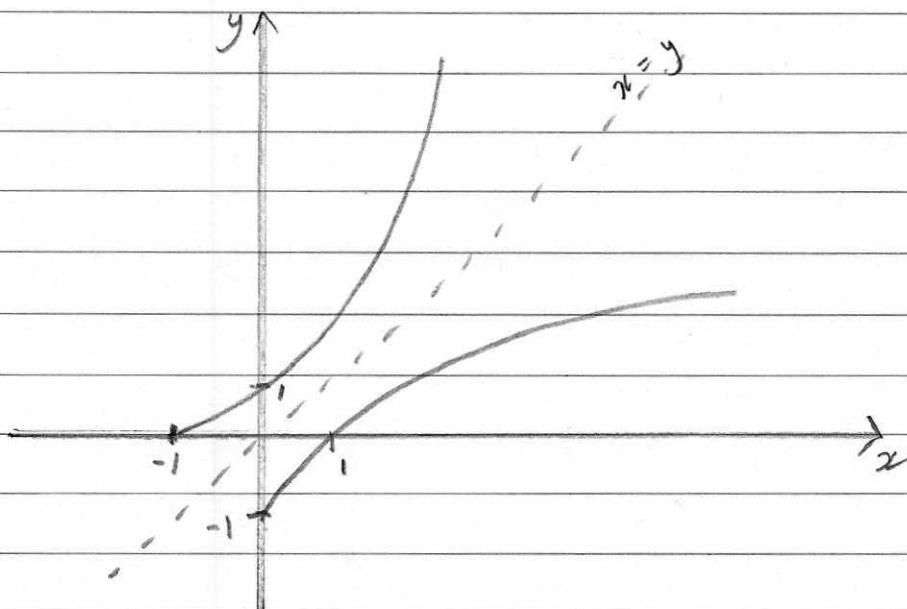
2a/

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

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

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

b/



c/

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

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

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

$$\sqrt{x} = y + 1$$

$$y = \sqrt{x} - 1$$

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

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

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

$$= 2 + \ln 1$$

$$= 2$$

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

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

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

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

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

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

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

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

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

$$4a) \quad f(x) > 0$$

$$b) \quad g f(x) = 2e^x + \ln e^x$$

$$= 2e^x + x$$

$$c) \quad g f(x) \in \mathbb{R}$$

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

$$b) \quad y = \frac{1}{x+2}$$

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

$$xy + 2x = 1$$

$$xy = 1 - 2x$$

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

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

$$c) \quad f \circ g(x) = \frac{1}{x^2 - 5 + 2}$$

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

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

$$2 = x^2 - 3$$

$$5 = x^2$$

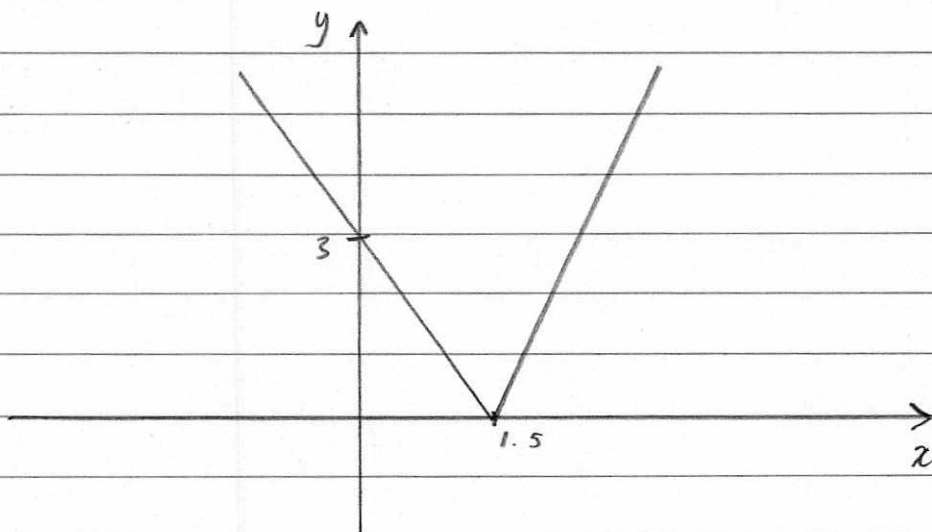
$$x = \underline{\underline{\pm\sqrt{5}}}$$

$$\begin{aligned}
 6a) \quad f(x) &= x^2 + 4x + 1 \\
 &= (x+2)^2 - 4 + 1 \\
 &= (x+2)^2 - 3
 \end{aligned}$$

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

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

7a/



$$\begin{array}{ll}
 b/ \quad 2x - 3 < 9 & -(2x - 3) < 9 \\
 \quad 2x < 12 & -2x + 3 < 9 \\
 \quad x < 6 & -2x < 6 \\
 & x > -3
 \end{array}$$

$$\underline{\underline{-3 < x < 6}}$$

$$\begin{array}{ll}
 c/ \quad 2x - 3 < x + 1 & -(2x - 3) < x + 1 \\
 \quad x - 3 < 1 & -2x + 3 < x + 1 \\
 \quad x < 4 & 3 < 3x + 1 \\
 & 2 < 3x \\
 & \cancel{x} < x > \frac{2}{3}
 \end{array}$$

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

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)

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

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

$$e^x = 3y - 2$$

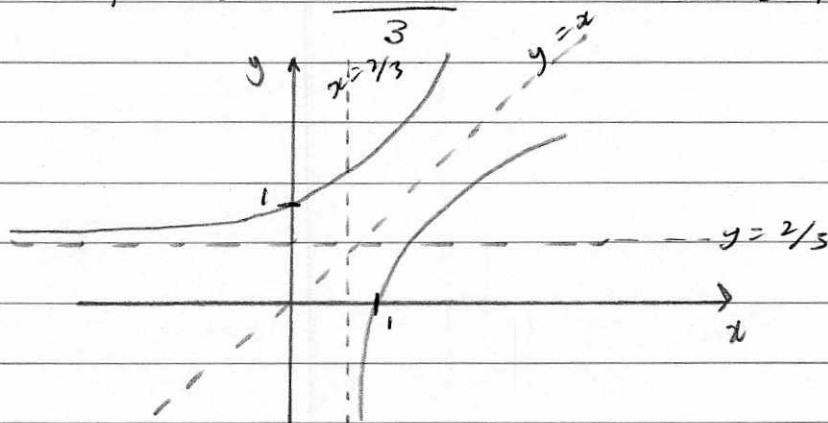
$$e^x + 2 = 3y$$

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

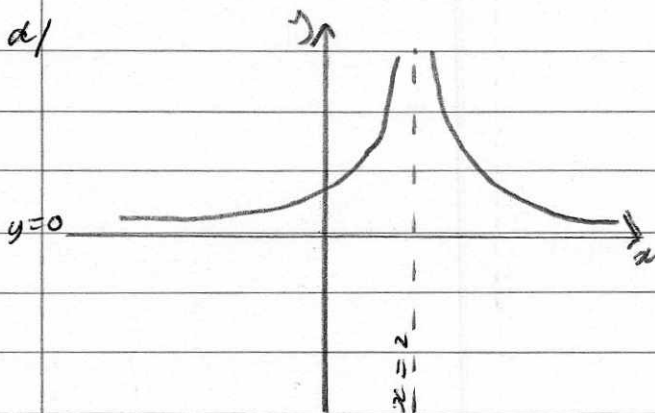
$$f^{-1}(x) = \frac{e^x + 2}{3}$$

$$x \in \mathbb{R}$$

c)



d)



e)

$$\frac{3}{x-2} = 4$$

$$\frac{-3}{x-2} = 4$$

$$3 = 4x - 8$$

$$-3 = 4x - 8$$

$$11 = 4x$$

$$5 = 4x$$

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

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