

11c)

$$y = x^2 \log x$$

$$y' = x + 2x \log x$$

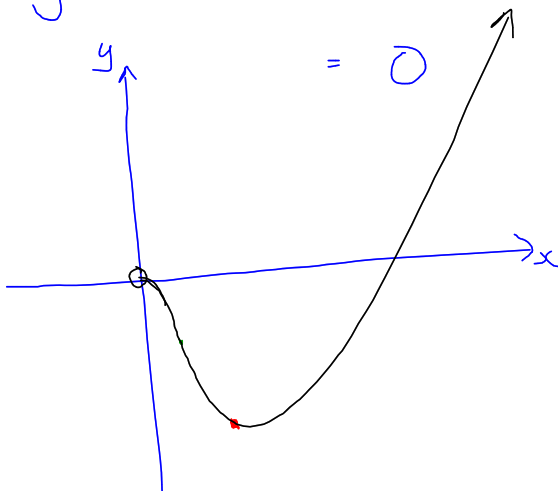
$$\lim_{x \rightarrow 0^+} x^2 \log x$$

$$= 0$$

d)

$$\lim_{x \rightarrow 0^+} x + 2x \log x$$

$$= 0$$



$$\text{sp} \left(\frac{1}{\sqrt{e}}, -\frac{1}{2e} \right)$$

$$\text{IP} \left(e^{-\frac{3}{2}}, -\frac{2}{3e^{\frac{3}{2}}} \right)$$

$$0.22, -0.18$$

$$13 \quad y = \log\left(\frac{x^2}{x+1}\right)$$

$$\frac{x^2}{x+1} > 0$$
$$x \neq -1$$
$$x^2(x+1) > 0$$
$$\frac{x^2}{x+1} = 0$$
$$x = 0$$

$$D: \underline{-1 < x < 0, x > 0}$$

$$D: y = \log(x-3)$$

$$x-3 > 0$$

$$\underline{x > 3}$$

$$\begin{aligned} \text{b) } y &= \log\left(\frac{x^2}{x+1}\right) \\ &= 2\log x - \log(x+1) \\ y' &= \frac{2}{x} - \frac{1}{x+1} \\ &= \frac{2(x+1) - x}{x(x+1)} \\ &= \frac{x+2}{x(x+1)} \end{aligned}$$

$$\begin{aligned} \text{c) } x &= -2, \\ y' &= \frac{-2+2}{-2(-2+1)} \\ &= 0 \end{aligned}$$

however $x = -2$
is not in domain
 \therefore stationary pts does not exist

$$d) \quad y' = \frac{x+2}{x(x+1)}$$

$$y'' = \frac{x(x+1)(1) - (x+2)[x(1) + (x+1)(1)]}{x^2(x+1)^2}$$

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

possible pts of inflection occur when $y'' = 0$

$$x^2 + x - x^2 - 2x - x^2 - 3x - 2 < 0$$

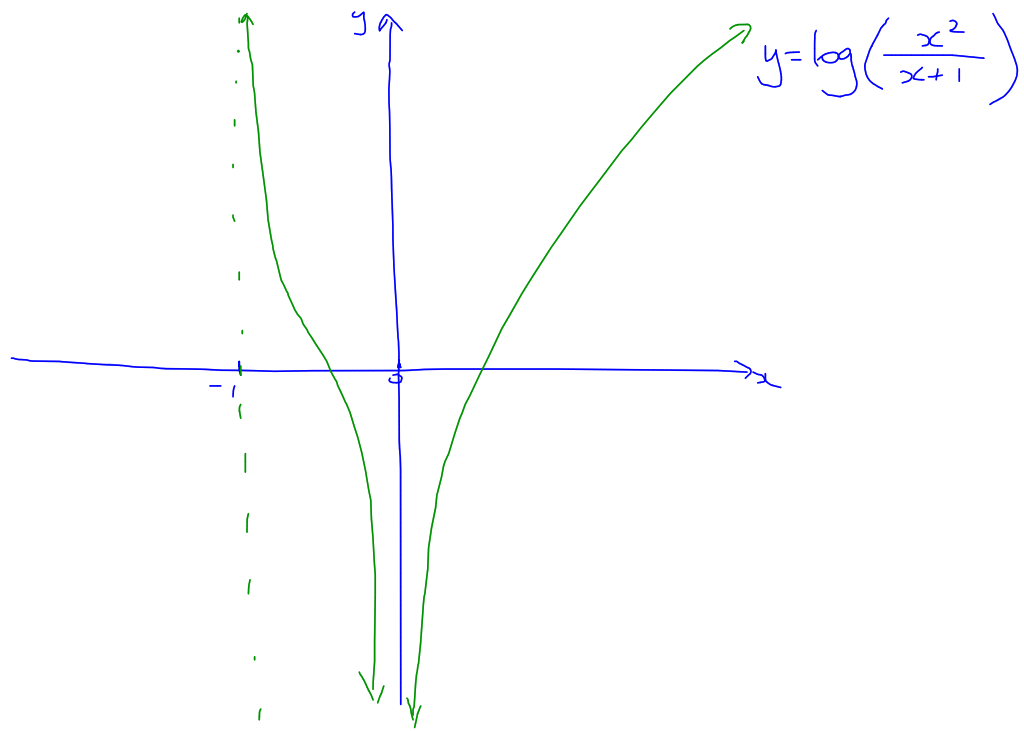
$$-x^2 - 5x - 2 = 0$$

$$x^2 + 5x + 2 = 0$$

$$x = \frac{-5 \pm \sqrt{21}}{2}$$

$$\therefore \text{one inflection pt}$$

$$x = \frac{-5 + \sqrt{21}}{2}$$



14

$$y = \log(\log x)$$

$$D: \begin{array}{l} \log x > 0 \\ \underline{x > 1} \end{array}$$

b) x int occurs when $y = 0$

$$\log(\log x) = 0$$

$$\log x = 1$$

$$\underline{x = e}$$

$$c) y' = \frac{\frac{1}{x}}{\log x}$$

$$= \frac{1}{x \log x} \neq 0$$

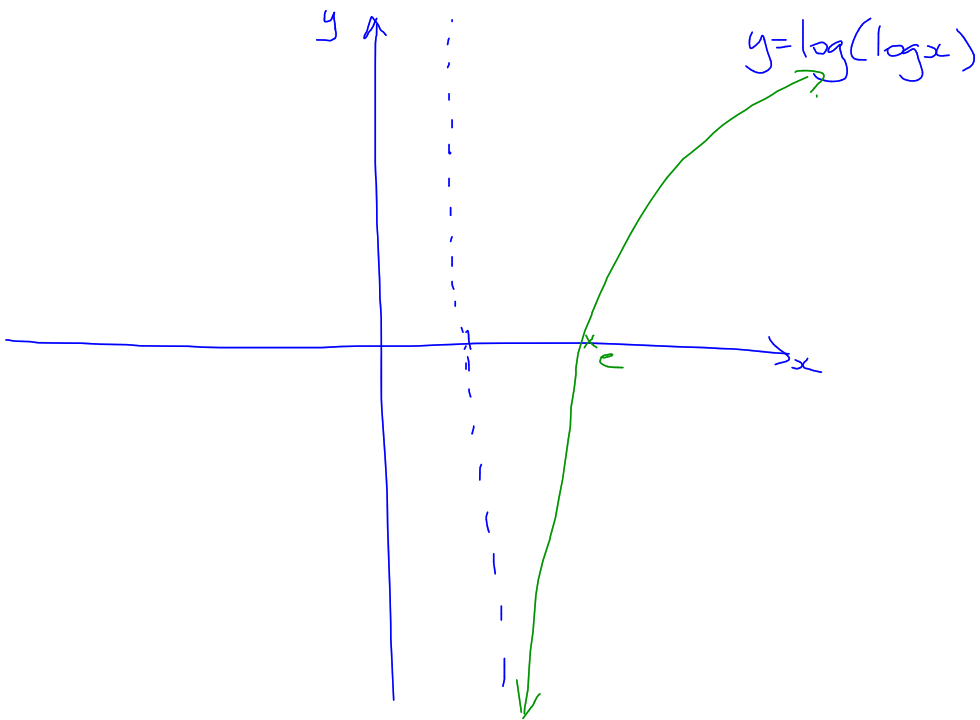
\therefore no stationary pts.

$$y'' = - \left[\frac{(x)(\frac{1}{x}) + (\log x)(1)}{(x \log x)^2} \right]$$

$$= \underline{\underline{\frac{-1 - \log x}{(x \log x)^2}}}$$

$$\begin{aligned}y''\left(\frac{1}{e}\right) &= \frac{-1 - \log\left(\frac{1}{e}\right)}{\left(\frac{1}{e} \log \frac{1}{e}\right)^2} \\ &= \frac{-1 + \log e}{\left(-\frac{1}{e} \log e\right)^2} \\ &= \frac{-1 + 1}{\left(\frac{1}{e}\right)^2}\end{aligned}$$

not an inflection⁼⁰ pt as $\frac{1}{e}$ is not in domain



18

$$y = x^{\frac{1}{\log x}}$$

$$\begin{aligned} \log y &= \log x^{\frac{1}{\log x}} \\ &= \frac{1}{\log x} \times \log x \end{aligned}$$

$$y = e^1$$

$$\log x \neq 0$$

$$x \neq 1$$

$$x > 0$$

$$D: 0 < x < 1, x > 1$$

