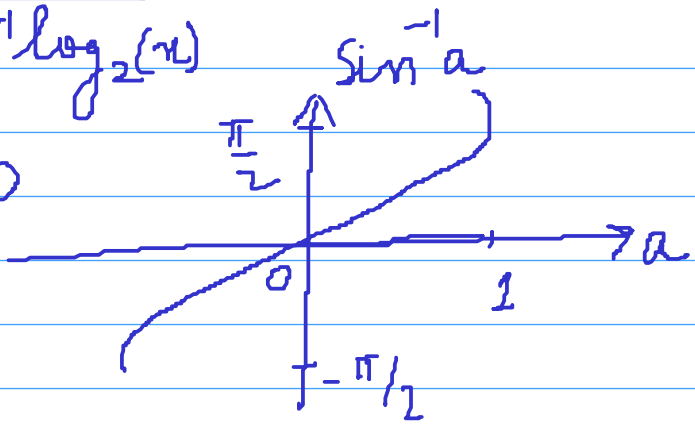
1.2.22 (a) $f(x) = \sqrt{\sin^{-1}\log_2(x)}$

$\sin^{-1}\log_2(x) \geq 0$

$0 \leq \log_2 x \leq 1$

$1 \leq x \leq 2$ Ans.



(b) $\log_2(\log_3 \log_4 x)$

$\log_3 \log_4 x > 0$

$\log_4 x > 1$

$x > 4$ $\quad x \in (4, \infty)$ Ans.

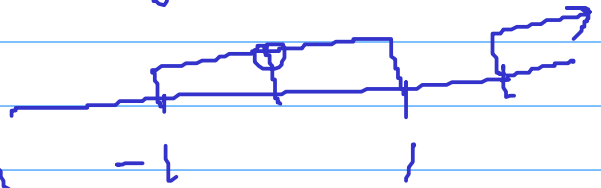
(c) $f(x) = \frac{1}{x} + 2^{\sin^{-1}x} + \frac{1}{\sqrt{x-2}}$

$x \neq 0$

$-1 \leq x \leq 1$

$x - 2 > 0, \quad x > 2$

$x \in \phi$



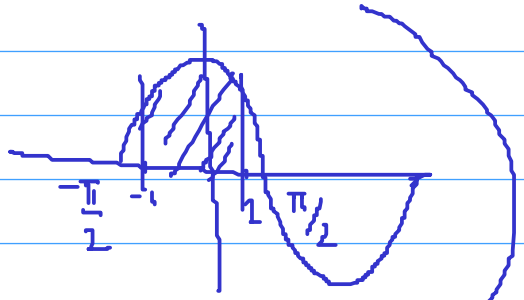
(d) $f(x) = \log|4 - x^2|$

$x \in (-\infty, \infty)$

e) $f(x) = \sqrt{\cos\sin x + \sin^{-1}\left(\frac{1+x^2}{2x}\right)}$

$\cos(\sin x) \geq 0$

$[-1, 1]$



$-1 \leq \frac{1+x^2}{2x} \leq 1$

$-1 \leq \frac{1+x^2}{2x}$

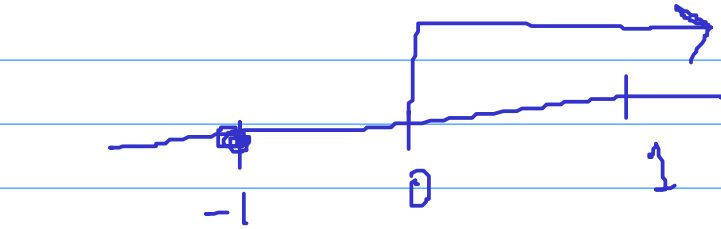
$\frac{1+x^2}{2x} + 1 \geq 0$

$\frac{(1+x)^2}{2x} \geq 0$ $\quad \frac{(1+x)^2}{2x} = 0 \Rightarrow x = -1$

$-\frac{(1+x)^2}{2x} \geq 0 \Rightarrow x > 0$

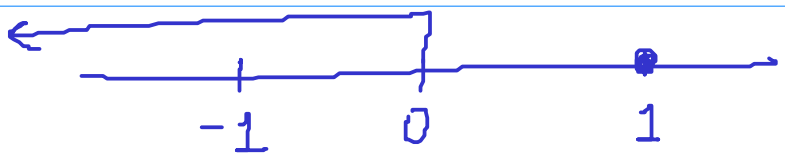
$\frac{1+x^2}{2x} \leq 1 \Rightarrow \frac{1+x^2}{2x} - 1 \leq 0$

$\frac{(1-x)^2}{2x} \leq 0$ $\quad x = 1$, $x < 0$



$x = -1, +1$

$|x| = 1.$ Ans



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

$\cos 3x = 1 \Rightarrow y = \frac{1}{2-1} = 1$

$\cos 3x = -1 \Rightarrow y = \frac{1}{2+1} = \frac{1}{3}$

$y \in \left[\frac{1}{3}, 1\right]$ Ans.

g) $y = \frac{x}{1+x^2}$

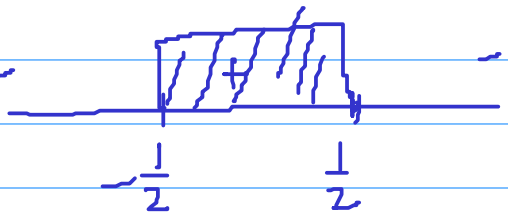
$y + yx^2 = x$

$yx^2 - x + y = 0$

$x = \frac{1 \pm \sqrt{1 - 4y^2}}{2y}$

$1 - 4y^2 \geq 0$

$(1-2y)(1+2y) \geq 0$



$y \in \left[-\frac{1}{2}, \frac{1}{2}\right]$ Ans.