

۱) الف) $\frac{x^2 + 1 - 2x - x^2}{x^2 - x - 2} \rightarrow \frac{1 - 2x - x^2}{x(x-1)} \rightarrow \frac{\frac{1}{x} - 2 - x}{1 - \frac{1}{x}} \quad (-\infty, 0) \cup (\frac{1}{x}, \infty)$

ب) $\frac{x^2 - 1}{x^2 + x - 2} = \frac{(x-1)(x+1)}{(x-1)(x+2)} = \frac{x+1}{x+2} \rightarrow \frac{x+1}{x+2} = \frac{(x+2) - 1}{x+2} = 1 - \frac{1}{x+2}$
 $Df = R - d - \frac{1}{x+2} - 1$

۲) الف) $(\frac{1}{x})^x = 1 \rightarrow x = -1$
 $x^x = 1 \rightarrow x = 0$

ب) $x-1 > 0 \rightarrow x > 1$
 $x+1 > 0 \rightarrow x > -1$
 $D = d(x, 0) \parallel x > 1$

۳) $x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) \rightarrow x < -1$ or $x > 2$
 $x^2 - 1 > 0 \rightarrow x < -1$ or $x > 1$

۴) $x^2 + ax - x^2 > 0 \rightarrow [a, b] \rightarrow -x^2 = \frac{x}{-1} \Rightarrow -x^2 = -x \Rightarrow x = 1$
 $x+b=a \Rightarrow a=b-x \rightarrow \frac{x}{-1} - x \rightarrow -\frac{1}{x}$
 $a+b = -\frac{1}{x} + \frac{x}{-1} = 1$

۵) $f(x) \cdot x > 0 \rightarrow x^2 - 2 - x = x^2 - x - 2 \Rightarrow x(x-1) > 0 \rightarrow x < 0$ or $x > 1$

۶) $\sin \frac{\pi}{4} \rightarrow \frac{\sqrt{2}}{2}$
 $\cos \frac{\pi}{4} \rightarrow \frac{\sqrt{2}}{2}$

$f(x) = x^2 + x$
 $(1 + \frac{\sqrt{2}}{2})^2 \Rightarrow \frac{1}{2} + \sqrt{2}$
 $x^2 = \frac{1}{2} + x\sqrt{2}$
 $x = \frac{1}{2} + x\sqrt{2}$

$$v) a, f(a)$$

$$\frac{a+1}{a-1} \neq 1, \quad a-1 = a+1$$

$$f(f(a)) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = a$$

$R = \{1\}$

$$1) f(0) \Rightarrow -r \rightarrow x^r - rx = -r \rightarrow (x-r)^r = 0 \rightarrow x=r$$

$$\sqrt{x^2-1} = r \rightarrow x^2 = \omega \rightarrow |x = \pm \sqrt{\omega}|$$

$$f(r) \rightarrow x+r=c \rightarrow x=1$$

$$f(r) = 1 - \omega + r = 0$$

$$x+r = -r \rightarrow x = -r \quad f(-r) = r^2 + r^2 + r = 0$$

$$f(r) \wedge f(-r) = r^2 + r^2 = 1 \neq 0$$

$$10) \quad r(\cos^2 u + \omega \cos u) = \frac{1}{r} \rightarrow \cos u \rightarrow \frac{1}{r} \rightarrow \tan^2 \rightarrow \frac{1 - \frac{1}{r}}{\frac{1}{r}} = 0$$

$$f\left(\frac{1}{r}\right) = 0$$

$$\cos^2 u + \omega \cos u = \frac{1}{r} \rightarrow (\cos u + \frac{\omega}{2})^2 = \frac{1}{r} + \frac{\omega^2}{4}$$

$$\cos u + \frac{\omega}{2} = \pm \sqrt{\frac{1}{r} + \frac{\omega^2}{4}}$$

$$\cos u = -\frac{\omega}{2} \pm \sqrt{\frac{1}{r} + \frac{\omega^2}{4}}$$