Exercise 9 For how many values of the coefficient a do the equations

$$0 = x^2 + ax + 1 \quad \text{and} \quad 0 = x^2 - x - a$$

have a common real solution?

(A) 0 **(B)** 1 **(C)** 2 **(D)** 3 **(E)** infinitely many

$ax+1 = -x-a$ | $a=-1$

$ax+a+x+1=0$ | $0=x^2-x+1$

$(a+1)(x+1)=0$ | x is orbi

$x=-1$

$0=1-a+1$

$0=1+1-a$

$a=2$

$$h(x) = f(g(x))$$

① $f(x) = ?$

$$h(g^{-1}(x)) = f(g(g^{-1}(x)))$$

$$h(g^{-1}(x)) = f(x)$$

② $g(x) = ?$

$$f^{-1}(h(x)) = f^{-1}(f(g(x)))$$

$$f^{-1}(h(x)) = g(x)$$

$$h(x) = f(g(x))$$

① $h(x) = 2x - 5$

$g(x) = \sqrt{x+5} - 4$ → $g^{-1}(x) = (x+4)^2 - 5$

Find $f(x) = h(g^{-1}(x))$

$= 2\left((x+4)^2 - 5\right) - 5$

② $h(x) = 3\sqrt{x-5}$ $\quad f^{-1}(x)$

$f(x) = \sin(x+5)$ → $= (\arcsin x) - 5$

$g(x) = f^{-1}(h(x)) = \arcsin\left(3\sqrt{x-5}\right) - 5$

$\arcsin\left(\sin\frac{4\pi}{3}\right)$ $\arcsin\left(\sin\frac{\pi}{4}\right)$

$= -\frac{\pi}{3}$ $= \frac{\pi}{4}$

$-\frac{\pi}{2} \le \arcsin x \le \frac{\pi}{2}$

$\arcsin\left(\sin\frac{4\pi}{3}\right)$

$= \arcsin\left(-\frac{\sqrt{3}}{2}\right)$

$= -\frac{\pi}{3}$

$$-\frac{\pi}{2} \leq \arcsin x \leq \frac{\pi}{2}$$

$$0 \leq \arccos x \leq \pi$$

$$-\frac{\pi}{2} < \arctan x < \frac{\pi}{2}$$

$$\frac{5\pi}{3} \qquad -\frac{\pi}{3}$$

$$\arctan\left(\tan\frac{7\pi}{6}\right) = \frac{\pi}{6}$$

Find all roots for

$$3x^4 - x^3 - 9x^2 + 9x - 2 = 0.$$

$$\frac{\pm 1, \pm 2}{\pm 1, \pm 3} \rightarrow \pm 1, \pm 2, \pm \frac{1}{3}, \pm \frac{2}{3}$$

1] 3 -1 -9 9 -2

	3	2	-7	2
1]	3	2	-7	2 | 0
		3	5	-2
	3	5	-2	| 0

$3x^2 + 5x - 2$

$= (3x - 1)(x + 2)$

$\frac{1}{3}$, -2

$x = \{1, -2, \frac{1}{3}\}$, 1 is mult. of (2).