

## Solving Equations

$$1) f(x) = 2x^2 + 5x - 12 = 0$$

$$2x^2 + 5x - 12 = 0$$

$$(2x-3)(x+4) = 0$$

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

$$2) f(x) = 3e^{2x+1} - 9 = 0$$

$$3e^{2x+1} = 9$$

$$e^{2x+1} = 3$$

$$2x+1 = \ln 3$$

$$2x = -1 + \ln 3$$

$$\boxed{x = \frac{-1 + \ln 3}{2}}$$

$$3) f(x) = 2\sin 3x - 1 \text{ in } [0, 2\pi]$$

$$2\sin 3x - 1 = 0$$

$$\sin 3x = \frac{1}{2}$$

$$3x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}, \frac{25\pi}{6}, \frac{29\pi}{6}$$

use  $[0, 6\pi]$

$$\boxed{x = \frac{\pi}{18}, \frac{5\pi}{18}, \frac{13\pi}{18}, \frac{17\pi}{18}, \frac{25\pi}{18}, \frac{29\pi}{18}}$$

$$4) f(x) = \ln(x-4) + 6 = 0$$

$$\ln(x-4) = -6$$

$$(x-4) = e^{-6}$$

$$\boxed{x = 4 + e^{-6}}$$

$$5) y = 2x^3 - 5x + 1 = 0$$

$$x = -1.6729$$

$$x = 1.469$$

$$x = 0.203$$

$$6) y = e^{2x} - 5x - 2 = 0$$

$$x = -0.287$$

$$x = 0.957$$

$$7) \begin{cases} x + y = 2 \\ 2x - y = 1 \end{cases}$$

$$\underline{3x = 3}$$

$$x = 1$$

$$1 + y = 2$$

$$y = 1$$

$$\boxed{(1, 1)}$$

$$8) \begin{cases} x^2 + y = 6 \\ x + y = 4 \end{cases} \rightarrow y = -x + 4$$

$$x^2 - x + 4 = 6$$

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

$$(x-2)(x+1) = 0$$

$$x = 2 \quad x = -1$$

$$\boxed{(2, 2) \quad (-1, 5)}$$

$$9) \begin{cases} y = x^4 - 2x^2 + 1 \\ y = 1 - x^2 \end{cases}$$

$$x = -1, 0, 1$$

$$(-1, 0)$$

$$(0, 1)$$

$$(1, 0)$$

$$10) \begin{cases} y = -|2x-3| + 6 \\ y = 6 - x \end{cases}$$

$$x = 1$$

$$(1, 5)$$

$$(3, 3)$$

$$11) \begin{cases} f(x) = \sin x \\ g(x) = \frac{1}{2}x^2 - 3 \end{cases}$$

$$f(x) = g(x) @$$

$$(-2.057, -0.884)$$

$$(2.638, 0.481)$$