

# Functions WS 1 (even solutions)

② a)  $\text{Dom } f = [-5, 5]$        $\text{Dom } g = [-4, 5]$   
 $\text{RNG } f = [-4, 4]$        $\text{RNG } g = [-4, 2]$

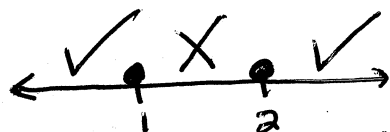
b)  $f(-2) = -2$        $g(3) = 2$

c) solve  $f(x) = g(x)$   
 $x = -2$  and  $x = 4$

d) solve  $f(x) = 2$   
 $x = -4$  and  $x = 4$

e) solve  $g(x) = 0$   
 $x = -1$

②①  $f(x) = \sqrt{x^2 - 3x + 2}$   
 $x^2 - 3x + 2 \geq 0$   
consider  $x^2 - 3x + 2 = 0$   
 $(x-2)(x-1) = 0$   
 $x = 2$        $x = 1$



$\text{Dom } f = (-\infty, 1] \cup [2, \infty)$

②④  $g(x) = \frac{1}{|x^2 - 4|}$

$|x^2 - 4| \neq 0$

$x^2 - 4 \neq 0$

$x^2 \neq 4$

$x \neq \pm 2$

$\text{Dom } g = \mathbb{R} - \{-2, 2\}$

$$\begin{aligned} \textcircled{46} \quad & \text{solve } f(x) = 0 \\ & 5x + 1 = 0 \\ & x = -\frac{1}{5} \\ & \therefore f\left(-\frac{1}{5}\right) = 0 \end{aligned}$$

$$\begin{aligned} \textcircled{48} \quad & \text{solve } f(x) = 0 \\ & \frac{12 - x^2}{5} = 0 \\ & 12 - x^2 = 0 \\ & 12 = x^2 \\ & x = \pm 2\sqrt{3} \end{aligned}$$

$$\begin{aligned} \textcircled{50} \quad & \text{solve } f(x) = 0 \\ & x^2 - 8x + 15 = 0 \\ & (x - 5)(x - 3) = 0 \\ & x = 5 \quad x = 3 \end{aligned}$$

$$\begin{aligned} \therefore & f(-2\sqrt{3}) = 0 \text{ and} \\ & f(2\sqrt{3}) = 0 \end{aligned}$$

$$\therefore f(3) = 0 \text{ and } f(5) = 0$$

$$\begin{aligned} \textcircled{52} \quad & \text{solve } f(x) = 0 \\ & x^3 - x^2 - 4x + 4 = 0 \\ & x^2(x - 1) - 4(x - 1) = 0 \\ & (x - 1)(x^2 - 4) = 0 \\ & (x - 1)(x - 2)(x + 2) = 0 \\ & x = 1 \quad x = 2 \quad x = -2 \end{aligned}$$

$$\begin{aligned} \therefore & f(-2) = 0, f(1) = 0, \\ & \text{and } f(2) = 0 \end{aligned}$$

$$\begin{aligned} \textcircled{54} \quad & \text{solve } f(x) = g(x) \\ & x^4 - 2x^2 = 2x^2 \\ & x^4 - 4x^2 = 0 \\ & x^2(x^2 - 4) = 0 \\ & x^2 = 0 \quad x^2 - 4 = 0 \\ & x = 0 \quad x^2 = 4 \\ & x = \pm 2 \end{aligned}$$

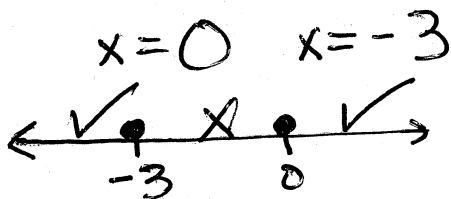
$$\begin{aligned} \therefore & f(-2) = g(-2), \\ & f(0) = g(0), \text{ and} \\ & f(2) = g(2) \end{aligned}$$

$$\begin{aligned} \textcircled{56} \text{ solve } f(x) &= g(x) \\ \sqrt{x} - 4 &= 2 - x \\ \sqrt{x} &= 6 - x \\ x &= (6 - x)^2 \\ x &= 36 - 12x + x^2 \\ 0 &= x^2 - 13x + 36 \\ 0 &= (x - 9)(x - 4) \end{aligned}$$

$$x = 9 \quad x = 4$$

$$\therefore f(4) = g(4) \text{ and } f(9) = g(9)$$

$$\begin{aligned} \textcircled{64} f(x) &= \sqrt[4]{x^2 + 3x} \\ x^2 + 3x &\geq 0 \\ \text{consider } x^2 + 3x &= 0 \\ x(x + 3) &= 0 \end{aligned}$$



$$\text{Dom } f = (-\infty, -3] \cup [0, \infty)$$

$$\textcircled{70} \text{ Dom } f = (-\infty, -3) \cup (3, \infty)$$

$$\begin{aligned} \textcircled{58} g(x) &= 1 - 2x^2 \\ \text{Dom } g &= \mathbb{R} = (-\infty, \infty) \end{aligned}$$

$$\begin{aligned} \textcircled{60} s(y) &= \frac{3y}{y+5} \\ y+5 &\neq 0 \\ y &\neq -5 \end{aligned}$$

$$\begin{aligned} \text{Dom } s &= \mathbb{R} - \{-5\} \\ &= (-\infty, -5) \cup (-5, \infty) \end{aligned}$$

$$\textcircled{66} h(x) = \frac{10}{x^2 - 2x}$$

$$\begin{aligned} x^2 - 2x &\neq 0 \\ x(x - 2) &\neq 0 \\ x &\neq 0 \quad x \neq 2 \end{aligned}$$

$$\text{Dom } h = \mathbb{R} - \{0, 2\}$$

$$\textcircled{68} f(x) = \frac{\sqrt{x+6}}{6+x}$$

$$\begin{aligned} 6+x &\neq 0 & x+6 &\geq 0 \\ x &\neq -6 & x &\geq -6 \end{aligned}$$

$\underbrace{\hspace{10em}}_{x > -6}$

$$\text{Dom } f = (-6, \infty)$$