

#74

$$f(x) = x^2 + 1$$

$$g(x) = \sqrt{2-x}$$

$$(f \circ g)(x) = f(g(x)) = f(\sqrt{2-x}) = (\sqrt{2-x})^2 + 1 = 2 - x + 1 = 3 - x$$

\uparrow
 $2-x \geq 0, \text{ i.e.}$
 $x \leq 2$

$$(f \circ g)(x) = 3 - x$$

$$\text{domain} = \{x \mid x \leq 2\} \text{ or } (-\infty, 2]$$

#78

$$h(x) = \sqrt{5x^2 + 3}$$

$$g(x) = 5x^2 + 3, \quad f(x) = \sqrt{x}$$

$$\text{hence } (f \circ g)(x) = f(g(x)) = f(\sqrt{5x^2 + 3}) = \sqrt{5x^2 + 3}$$

#80

$$h(x) = |3x - 4|$$

$$g(x) = 3x - 4 \text{ and } f(x) = |x|$$

$$\text{hence } (f \circ g)(x) = f(g(x)) = f(3x - 4) = |3x - 4|$$

#82

$$h(x) = \frac{1}{4x + 5}$$

$$g(x) = 4x + 5, \quad f(x) = \frac{1}{x}$$

$$\text{hence } (f \circ g)(x) = f(g(x)) = f(4x + 5) = \frac{1}{4x + 5}$$