

حل واجب المحاضرة الثالثة:

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

$(g \circ f)(x)$

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

$(f \circ g)(x)$

$$f(g(x)) = f(\sqrt{x+2}) \\ = (\sqrt{x+2})^2 - 3\sqrt{x+2} \\ = x + 4 - 3\sqrt{x+2} \\ = -2\sqrt{x+2} + 4$$

② $f(x) = \sqrt{25 - x^2}$, $g(x) = \sqrt{x-3}$

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

$$= g(\sqrt{25 - x^2}) = g(5 - x) \\ = \sqrt{5 - x - 3} = \sqrt{2 - x}$$

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

$$= f(\sqrt{x-3}) \\ = \sqrt{25 - (\sqrt{x-3})^2} \\ = \sqrt{25 - x - 3} \\ = \sqrt{22 - x}$$

③ $f(x) = \sqrt{x-15}$, $g(x) = x^2 + 2x$

$(g \circ f)(x) = g(f(x)) = g(\sqrt{x-15})$

$$= x - 15 + 2\sqrt{x-15} \\ = 3x - 15$$

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

$$= f(x^2 + 2x) \\ = \sqrt{x^2 + 2x - 15}$$