ANSWER SHEET

Compound and Inverse Functions

Q1

① $f(x) = x - 5$

a) $f(6)$

$f(6) = 6 - 5$

$= 1$

b) $f(4)$

$f(4) = 4 - 5$

$= -1$

Q2

② $g(x) = 2x^2 - 12$

a) $g(3) = 2(3)^2 - 12$

$= 6$

b) $g(-3) = 2(-3)^2 - 12$

$= 6$

c) $g(x) = 6$

$2x^2 - 12 = 6$

$2x^2 = 18$

$x^2 = 9$

$x = \pm 3$

Q3

(3) $f(x) = 4x - 6$

a) $f(2)$

$f(2) = 4(2) - 6$

$= 2$

b) $f(-2) = 4(-2) - 6$

$= -14$

c) $f(x) = 2$

$4x - 6 = 2$

$4x = 8$

$x = 2$

Q4

(4) $f(x) = x^2 - 4$

a) $f(8) = (8)^2 - 4$

$= 60$

b) $f(-1) = (-1)^2 - 4$

$= -3$

c) $f^{-1}(x) = 10$

$y = x^2 - 4$

$x = y^2 - 4$

$x + 4 = y^2$

$y = \sqrt{x+4} \quad \Rightarrow \quad f^{-1}(x) = \sqrt{x+4}$

$10 = \sqrt{x+4}$

$100 = x + 4$

$x = 96$

Q5

(5) $f(x) = 2x - 6$, $g(x) = 3x + 6$

a) $f(4) = 2(4) - 6$

$= 2$

$g(2) = 3(2) + 6$

$= 12$

b)

$y = 2x - 6$

$x = 2y - 6$

$\frac{x+6}{2} = y \quad \Rightarrow \quad f^{-1}(x) = \frac{x+6}{2}$

c) $2x - 6 = 3x + 6$

$-x = 12$

$x = -12$

Q6

(6) $f(x) = 6x + 1$, $g(x) = x^2$

a) $fg(x) = 6x^2 + 1$

b) $gf(x) = (6x + 1)^2$

c) $fg(x) = gf(x)$

$6x^2 + 1 = (6x + 1)^2$

$6x^2 + 1 = (6x + 1)(6x + 1)$

$6x^2 + 1 = 36x^2 + 6x + 6x + 1$

$6x^2 + 1 = 36x^2 + 12x + 1$

$0 = 30x^2 + 12x$

$6x(5x + 2) = 0$

$x = 0$, $x = -\frac{2}{5}$

Q7

(7) $f(x) = x^2 + 2$, $g(x) = x + 4$

a) $g^{-1}(x)$

$y = x + 4$

$x = y + 4$

$y = x - 4$

b) $y = x^2 + 2$

$x = y^2 + 2$

$y = \sqrt{x - 2}$

c) $\sqrt{x-2} = x - 4$

$x - 2 = (x-4)^2$

$x - 2 = (x-4)(x-4)$

$x - 2 = x^2 - 4x - 4x + 16$

$x - 2 = x^2 - 8x + 16$

$0 = x^2 - 9x + 18$

$0 = (x-3)(x-6)$ $\Rightarrow x = 3$ OR $x = 6$

Q8

(8) $f(x) = x^2 - 16$

a) $f(x-3)$

$f(x-3) = (x-3)^2 - 16$

$= (x-3)(x-3) - 16$

$= x^2 - 3x - 3x + 9 - 16$

$= x^2 - 6x - 7$

b) $f(x-3) = 0$

$x^2 - 6x - 7 = 0$

$x^2 - 7x + x - 7 = 0$

$x(x-7) + 1(x-7) = 0$

$(x+1)(x-7) = 0$

$x = -1$ OR $x = 7$

Q9

(9) $f(x) = 4x - 2$

a) $y = 4x - 2$

$x = 4y - 2$

$\frac{x+2}{4} = y \Rightarrow f^{-1}(x) = \frac{x+2}{4}$

b) $g(x) = mx^2$

$\therefore fg(2) = 14$

$g(2) = 4m$

Fa $fg(2)$, since $g(2) = 4m$

$f(4m) = 4(4m) - 2$

$= 16m - 2$

$\therefore (fg(2) = 14)$

$16m - 2 = 14$

$16m = 16$

$m = 1$