Homework 3 Solutions

8. (a) Determine $(fg)(x)$:

$$\begin{aligned}(fg)(x) &= f(x)g(x)\\ &= (2x^2+x)(5-x)\\ &= 10x^2-2x^3+5x-x^2\\ &= -2x^3+9x^2+5x.\end{aligned}$$

Determine $(f/g)(x)$:

$$\begin{aligned}(f/g)(x) &= f(x)/g(x)\\ &= \frac{(2x^2+x)}{(5-x)}\end{aligned}$$

(b) Evaluate $(fg)(-3)$:

$$\begin{aligned}(fg)(-3) &= -2(-3)^3+9(-3)^2+5(-3)\\ &= 54+81-15\\ &= 120.\end{aligned}$$

Evaluate $(f/g)(-3)$:

$$\begin{aligned}(f/g)(-3) &= \frac{2(-3)^2+(-3)}{5-(-3)}\\ &= \frac{18-3}{5+3}\\ &= \frac{15}{8}.\end{aligned}$$

20. (a) Find $(f\circ g)(x)$:

$$\begin{aligned}(f\circ g)(x) &= f(g(x))\\ &= f(x^2+2x)\\ &= 3(x^2+2x)+1\\ &= 3x^2+6x+1.\end{aligned}$$

(b) Find $(g\circ f)(x)$:

$$\begin{aligned}(g\circ f)(x) &= g(f(x))\\ &= g(3x+1)\\ &= (3x+1)^2+2(3x+1)\\ &= (9x^2+6x+1)+(6x+2)\\ &= 9x^2+12x+3.\end{aligned}$$