

Name: **Solutions**

Date:

Some Review Problems

Let $f(x) = 2x + 1$ and $g(x) = 2x^2 + x$. Evaluate and completely simplify the following

1. $f(2) + g(-2)$

$$2(2) + 1 + 2(-2)^2 + (-2) = \mathbf{11}$$

2. $f(2a)$

$$2(2a) + 1 = \mathbf{4a + 1}$$

3. $g(2a)$

$$2(2a)^2 + (2a) = \mathbf{8a^2 + 2a}$$

4. $f(-x)$

$$2(-x) + 1 = \mathbf{-2x + 1}$$

5. $g(-x)$

$$2(-x)^2 + (-x) = \mathbf{2x^2 - x}$$

6. $f(2 + a)$

$$2(2 + a) + 1 = \mathbf{5 + 2a}$$

7. $g(2 + a)$

$$\begin{aligned} &2(2 + a)^2 + (2 + a) \\ &= 2(4 + 4a + a^2) + 2 + a \\ &= \mathbf{10 + 9a + 2a^2} \end{aligned}$$

8. $(f - g)(x)$

$$\begin{aligned} &(2x + 1) - (2x^2 + x) = \\ &\mathbf{-2x^2 + x + 1} \end{aligned}$$

9. $f(x) \cdot g(x)$

$$\begin{aligned} &(2x + 1)(2x^2 + x) = \\ &\mathbf{4x^3 + 4x^2 + x} \end{aligned}$$

10. $\frac{f(x)}{g(x)}$

$$\frac{2x + 1}{2x^2 + x} = \frac{2x + 1}{x(2x + 1)} = \frac{1}{x}$$

11. $f(g(x))$

$$2(2x^2 + x) + 1 = \mathbf{4x^2 + 2x + 1}$$

12. $g(f(x))$

$$\begin{aligned} &2(2x + 1)^2 + (2x + 1) = \\ &2(4x^2 + 4x + 1) + 2x + 1 = \\ &\mathbf{8x^2 + 10x + 3} \end{aligned}$$

13. $\frac{1}{x}g(x)$

$$\frac{1}{x}(2x^2 + x) = \mathbf{2x + 1} = f(x)$$

14. $\frac{f(x+\Delta x)-f(x)}{\Delta x}$

$$\begin{aligned} &= \frac{(2(x + \Delta x) + 1) - (2x + 1)}{\Delta x} = \\ &\frac{2\Delta x}{\Delta x} = \mathbf{2} \end{aligned}$$

15. $\frac{g(x+\Delta x)-g(x)}{\Delta x}$

$$\begin{aligned} &= \frac{(2(x + \Delta x)^2 + (x + \Delta x)) - (2x^2 + x)}{\Delta x} \\ &= \frac{2x^2 + 4x\Delta x + 2\Delta x^2 + x + \Delta x - 2x^2 - x}{\Delta x} \\ &= \mathbf{4x + 2\Delta x + 1} \end{aligned}$$