



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. $g(2 + a)$
 $2(2 + a)^2 + (2 + a)$
 $= 2(4 + 4a + a^2) + 2 + a$
 $= \mathbf{10 + 9a + 2a^2}$

8. $(f - g)(x)$
 $(2x + 1) - (2x^2 + x) =$
 $\mathbf{-2x^2 + x + 1}$

9. $f(x) \cdot g(x)$
 $(2x + 1)(2x^2 + x) =$
 $\mathbf{4x^3 + 4x^2 + x}$

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

11. $f(g(x))$
 $2(2x^2 + x) + 1 = \mathbf{4x^2 + 2x + 1}$

12. $g(f(x))$
 $2(2x + 1)^2 + (2x + 1) =$
 $2(4x^2 + 4x + 1) + 2x + 1 =$
 $\mathbf{8x^2 + 10x + 3}$

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

14. $\frac{f(x+\Delta x) - f(x)}{\Delta x}$
 $= \frac{(2(x + \Delta x) + 1) - (2x + 1)}{\Delta x} =$
 $\frac{2\Delta x}{\Delta x} = \mathbf{2}$

15. $\frac{g(x+\Delta x) - g(x)}{\Delta x}$
 $= \frac{(2(x + \Delta x)^2 + (x + \Delta x)) - (2x^2 + x)}{\Delta x}$
 $= \frac{2x^2 + 4x\Delta x + 2\Delta x^2 + x + \Delta x - 2x^2 - x}{\Delta x}$
 $= \mathbf{4x + 2\Delta x + 1}$