> Complete the problems listed below for up to 10 points extra credit points toward your quiz grade. Submissions without work will receive **no credit**.

Recall the following derivative rules:

- (Constant multiple rule) $d/dx[k \cdot f(x)] = k \cdot d/dx[f(x)]$

- (Sum rule) $d/dx[f(x) + g(x)] = d/dx[f(x)] + d/dx[g(x)]$

- (General power rule) $d/dx[g(x)^r] = r \cdot [g(x)]^{r-1} \cdot d/dx[g(x)]$

For each of the following functions, compute the first and second derivative using the derivative rules above. In each step of your work, indicate which derivative rule you are using. For example, your answer for the first derivative of $f(x) = 3x^2 + 2x$ should look like this:

- By the **sum rule**: $d/dx[f(x)] = d/dx[3x^2] + d/dx[x]$

- By the **constant multiple rule**: $d/dx[3x^2] = 3 \cdot d/dx[x^2] = 3 \cdot (2x)$

Final answer: $d/dx[f(x)] = 6x + 2$.

Your answer for the second derivative should look like this:

- By the **sum rule**: $d^2/dx^2[f(x)] = d/dx[6x] + d/dx[1]$.

- By the **constant multiple rule**: $d/dx[6x] = 6 \cdot d/dx[x] = 6$.

Final answer: $d^2/dx^2[f(x)] = 6$.

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1. $f(x) = x^4 - \frac{3}{x^2}$

2. $f(x) = 3x^7 - x^5 + 8$

3. $f(x) = 12 + \frac{1}{7^3}$

4. $f(x) = (2x + 1)^{-2}$

5. $f(x) = \pi^2 x$

6. $f(x) = \left(\frac{\sqrt{2}}{x}\right)^{-7}$

7. $f(x) = \frac{1}{3x^3} + 7x$

8. $f(x) = 2\sqrt[4]{e} - 3x$

9. $f(x) = (\pi x + 17)^{11}$

10. $f(x) = \frac{x}{2} + \frac{2}{x-2}$