BONUS PROBLEM SET:

DIFFERENTIATION EDITION

Differentiate the problems below:

1. $F(x) = 11x^5 - 6x^3 + 8$
2. $F(x) = \frac{x^4}{4} - \frac{x^3}{3} + \frac{x^2}{2} - \frac{x}{1}$
3. $f(x) = \frac{ax^2 + bx + c}{cx^2 + bx + a}; a, b, c \text{ constant}$
4. $G(x) = \frac{7x^4 + 11}{x^2 + 1}$
5. $G(x) = \left(9x^8 - 8x^9\right)\left(1 + \frac{1}{x^2}\right)$

Find dy/dx:

1. $y = 3x^4 - x^2 + 1$
2. $y = x^2 + 2x^{-4}$
3. $y = \frac{x^3 + 1}{x^3 - 1}$
4. $y = \left(\frac{x}{1+x}\right)\left(\frac{2-x}{3}\right)$
5. $y = \frac{\left(x^3 + 21\right)\left(\frac{x^7}{5} - 2\right)}{x^2 - \frac{1}{8}}$

Find the indicated derivative:

1. $\frac{d}{dx}(2x - 5)$
2. $\frac{d}{dx}\left[\left(3x^2 - x^{-1}\right)\left(2x - 3x^{-2}\right)\right]$
3. $\frac{d}{dy}\left[y^2\left(1 - u^2\right)\left(1 - u^3\right)\right]$
4. $\frac{d}{dx}\left(\frac{x^3 + x^2 + x - 1}{x^3 - x^2 + x + 1}\right)$
5. $\frac{d}{dt}\left(\frac{2t^3 + 1}{t^4}\right)$
6. $\frac{d}{du}\left(\frac{u}{u-1} - \frac{u}{u+1}\right)$
7. $\frac{d}{dx}\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)$
8. $\frac{d}{dx}\left(\sqrt{\frac{3x+1}{2x+5}}\right)$
9. $\frac{d}{dx}\left(x^{\frac{2}{3}} - 7x^{\frac{1}{8}}\right)$
10. $\frac{d}{dx}\left(\frac{\sqrt[3]{x}}{\sqrt[5]{x^2}} \cdot x^{\frac{2}{7}}\right)$
11. $\frac{d}{dx}(x + \sin(2x))$
12. $\frac{d}{dx}\left(\cos^3(x) + 6\cos x\right)$
13. $\frac{d}{dt}\left(t\sec\left(t^2\right) + 2t^3\right)$
14. $\frac{d}{d\theta}(\cot(3\theta + \pi))$
15. $\frac{d}{dx}\left(\frac{\sin 2x}{1 + \cos x}\right)$
16. $\frac{d}{dx}\left(x^2\cos(2x - 1)\right)$
17. $\frac{d}{dy}\tan\sqrt{2x+1}$
18. $\frac{d}{dx}\left(\sin x + x^2\sin^2(\pi x)\right)$
19. $\frac{d}{da}\left(a\sin^2 a^2 + a^2\cot^2 a - \tan a\csc a\right)$
20. $\frac{d}{dx}\left(x\cos^{\frac{5}{2}}\left(\frac{3}{2}\right) + \frac{1}{\sec^2\left(x^{\frac{3}{2}}\right)}\right)$