Mathematics Review Course
Summer 2023
Problem Set 03

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Note: [Source] at the start of each problem denotes the source of the question. If there is no source, it is an original problem of my creation.

First Derivatives

1. [Xmath Project] Find $\frac{d}{dx}$ for $f(x) = 2x(x^2 + 3x)$
2. [Xmath Project] Find $\frac{d}{dx}$ for $g(x) = (\frac{1}{x} + 1)(x - 1)$.
3. [Paul Dawkins] Find $\frac{d}{dt}$ for $V(t) = \frac{6(t)^{1/3}}{4t+1}$
4. [Paul Dawkins] Find $\frac{d}{dw}$ for $h(w) = e^{w^4-3w^2+9}$
5. Find $\frac{d}{dx}$ for $f(x) = \left(\frac{x^4}{x+3}\right)(ln(x) - 3x)^{-2}$

Implicit Functions

6. Find $\frac{dy}{dx}$ for $(x - y)^2 = x + y - 1$
7. Find $\frac{dy}{dx}$ for $xe^y = x - y$
8. Find $\frac{dy}{dx}$ for $x^3 + y^3 = 7$
9. Find $\frac{dy}{dx}$ for $\frac{y}{1-x^2} = 6y + 7x$
10. Find $\frac{dy}{dx}$ for $\frac{3xy}{x^5+y^2} = 1$

Critical Points

11. [Paul Dawkins] Critical points for $A(t) = 3t - 7ln(8t + 2)$
12. [Paul Dawkins] Critical points for $f(x) = 5xe^{9-2x}$
13. [Paul Dawkins] Critical points for $f(z) = \frac{z+4}{2z^2+z+8}$