Section 2 Review

Basic Derivatives

1. Give the following derivatives.

A. $\frac{d}{dx}\left[3x^4 + 2x^3 + x - 5\right]$

B. $\frac{d}{dx}\left[6\sqrt{x} + \sqrt[6]{x} + \frac{6}{\sqrt{x}}\right]$

C. $\frac{d}{dx}\left[3e^x + 2\ln x\right]$

D. $\frac{d}{dx}\left[4\sin(x) + 3\tan(x)\right]$

E. $\frac{d}{dx}\left[5\sec(x) + 3\arcsec(x)\right]$

F. $\frac{d}{dx}\left[2\arctan(x) + 5\arcsin(x)\right]$

G. $\frac{d}{dx}\left[e^x + x^e + \frac{e}{x} + e\right]$

H. $\frac{d}{dx}\left[5^x + x^5 + \sqrt[5]{x} + \frac{5}{x} + 5\right]$

Derivative Rules

2. Compute the following derivatives.

A. $\frac{d}{dx}\left[x^{2025}\sin(x)\right]$

B. $\frac{d}{dx}\left[\frac{x^{2025}}{\tan(x)}\right]$

C. $\frac{d}{dx}\left[2\left(x^3 + x^2 + x + 1\right)^{2025}\right]$

D. $\frac{d}{dx}\left[\sin(x)\,\arctan(x)\,\ln(x)\right]$

E. $\frac{d}{dx}\left[\sec\left(x^{2025} + 2025x\right)\right]$

F. $\frac{d}{dx}\left[\left(\operatorname{arcsec}\left(\ln(x)\right)\right)^{2025}\right]$

E. $\frac{d}{dx}\left[x\ln x\right]$

F. $\frac{d}{dx}\left[x\,e^{x^2}\right]$

Implicit Differentiation

3. Compute y' in terms of x and y if $x^2 + \tan(xy) + \ln(xy) = 3$.

Tangent Lines

4. Find the tangent line to $y = x^2 + 3x + 2$ at the point $x = 1$.

5. Find the tangent line to $y = (2x + 5)\, e^x$ at the point $x = 0$.

6. Find the tangent line to $y = (2x + 1)^{2025}$ at the point $x = 0$.

7. Find the tangent line to $x^3 y^2 + x - y = 3$ at $(1, 2)$.