ACMAT161 Summer 2024
Professor Manguba-Glover
Classwork 11 & 12   Name: _____

Complete as many of the following problems as you can with your table in the allotted time. You do not have to go in order.

Classwork 11

1. Differentiate $\sqrt{13x^2 - 5x + 8}$

2. Differentiate $\frac{(x^3+4)^5}{(1-2x^2)^3}$

3. Differentiate $\frac{x^2+4x}{(3x^3+2)^4}$

4. Differentiate $x^2 e^{-x}$

5. Differentiate $x \tan^3(2x)$

6. Differentiate $x \tan^{-1}\left(\frac{x}{2}\right)$

7. Differentiate $\log_5(2x+1)$

8. Differentiate $\frac{\ln x^2}{x^2}$

Key:

1. $\frac{26x-5}{2\sqrt{13x^2-5x+8}}$

2. $\frac{(3x)(x^3+4)^4(-6x^3+5x+16)}{(1-2x^2)^4}$

3. $\frac{(3x^3+2)(2x+4)-36x^3(x^2+4x)}{(3x^3+2)^5}$

4. $2xe^{-x} - e^{-x}x^2$

5. $\tan^3(2x) + 6x \tan^2(2x) \sec^2(2x)$

6. $\tan^{-1}\frac{x}{2} + \frac{2x}{4+x^2}$

7. $\frac{2}{(2x+1)\ln 5}$

8. $\frac{2(1-\ln x^2)}{x^3}$

Classwork 12

1. Find $\dfrac{dy}{dx}$ for $x + \ln y = x^2 y^3$

2. Find $\dfrac{dy}{dx}$ of $e^{xy} = e^{4x} - e^{5y}$

3. Find y' for $\sin xy = x^2 + y$

4. Find y'' for $x^2 + y^2 = 1$

5. Find the equation of the line tangent to $3(x^2 + y^2)^2 = 25(x^2 - y^2)$ at $(2, 1)$

6. Find the equation of the tangent line to $x^2 + \tan\left(\dfrac{\pi}{4}xy\right) = 2$ at $(1, 1)$

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

Key:

1. $\dfrac{dy}{dx} = \dfrac{2\sqrt{y}}{\sqrt{x}(4+9y)}$

2. $\dfrac{dy}{dx} = \dfrac{4e^{4x}-e^{xy}y}{xe^{xy}+5e^{5y}}$

3. $\dfrac{2x-y\cos xy}{x\cos xy - 1}$

4. $-\dfrac{1}{y^3}$

5. $y - 1 = -\dfrac{2}{11}(x - 2)$

6. $y - 1 = -\left(\dfrac{16}{\pi} + 1\right)(x - 1)$

7. $y - 1 = -(x - 1)$