

Part I – Multiple choices (correct answer: 3 pts / work: 3 pts)

1. If $y = \ln((x + 1)^2 + y^2)$, then the value of $\frac{dy}{dx}$ at the point $(0, 0)$ is

- A) 0 B) $\frac{1}{2}$ C) 1 D) 2 E) undefined

2. If $\tan y = x$, what is dy/dx ?

- A) $\sec^2 x$ B) $\cos^2 x$ C) $\frac{1}{1+x^2}$ D) $\frac{1}{\sqrt{1+x^2}}$ E) $\frac{1}{\sqrt{x^2-1}}$

3. $\lim_{h \rightarrow 0} \frac{1}{h} \ln\left(\frac{2+h}{2}\right)$ is

- A) e^2 B) 1 C) $1/2$ D) 0 E) nonexistent

4. If $xy^2 + 2xy = 8$, then, at the point $(1, 2)$, y' is

- A) $-\frac{5}{2}$ B) $-\frac{4}{3}$ C) -1 D) $-\frac{1}{2}$ E) 0

Part II – Short response (6 pts each)

Solve for $\frac{dy}{dx}$.

5. $y = \cos^{-1}(2x)$

6. $y = \ln(e^x)$

7. $x^2 + xy = 1$

8. $\sec y = x$

Part III – Free response (10 pts each)

9. Let $y = \ln((x - 1)^3 \sqrt{x})$

10. Find equations of tangent line and normal line for $y = \sin^{-1} x$ at $x = \frac{1}{2}$.

11. Find the points on the ellipse $x^2 + 4y^2 = 1$ where the tangent line has slope 1.

12. Find the derivative at the given point.

a. $\cos(xy) = x + y$ at $(1, 0)$

b. $y = x \tan^{-1}(3x)$ at $x = \frac{1}{3}$