Math 19: Quiz 5 Solutions Name:

For full credit you must show your work. Partial credit may be given for incorrect solutions if sufficient work is shown.

Compute the derivatives for the following functions. (3 + 3 pts)

1.
$$f(x) = (x^4 + 6x)^8$$

$$f'(x) = 8(x^4 + 6x)^7(4x^3 + 6).$$

2.
$$f(x) = \ln(2e^x + 1)$$

$$f'(x) = \frac{1}{2e^x + 1} 2e^x.$$

3. Use implicit differentiation to find y', then determine the slope of the tangent line at the point $(6, 1)$. (4 pts)
$$xy + y^2 = 7$$

We differentiate both sides, remembering to use the product rule for the xy term and the chain rule for y^3 term.

$$y + y'x + 2yy' = 0$$
$$y'x + 2yy' = -y$$
$$y'(x + 2y) = -y$$
$$\boxed{y' = -\frac{y}{x + 2y}}$$

The slope of the tangent line at the point $(6, 1)$ is found by plugging the point into the equation above.

$$y'\big|_{(6,1)} = -\frac{1}{6 + 2(1)} = -\frac{1}{8}.$$