

Name: \_\_\_\_\_

1. [2 parts; 1.5 points each] Differentiate the given function.

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

(b)  $f(x) = e^{\sqrt{x}} \ln(x)$

2. [3 parts, 1 point each] Find the indicated integral.

(a)  $\int 4x^5 - 2x^2 \, dx$

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(b)  $\int \frac{1}{x^3}(x^2 + 1)^2 dx$

(c)  $\int \frac{2t^2 + 3t + 4}{t^{3/2}} dt$

3. [2 points] Solve the given initial value problem for  $y = f(x)$ .

$$\frac{dy}{dx} = (e^x + 1)^2 \quad \text{where } y = \frac{1}{2} \text{ when } x = 0.$$

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4. [2 points] Find the derivative  $f'(x)$ . (Hint: Use logarithmic differentiation.)

$$f(x) = \frac{(2x+3)^6(4x^2-3)^3}{\sqrt{x^5+2x}}$$