Name:

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30 minutes maximum. 24 points possible; each part is worth 2 points. No aids (book, notes, calculator, phone, etc.) are permitted. Show all work and use proper notation for full credit. Answers should be in reasonably-simplified form.

1. [12 points] Compute the derivatives of the following functions.

a. 
$$f(x) = e^{2x^{1/2} + 2e^x + \sqrt{9}}$$
  

$$f'(x) = e^{2x^{1/2} + 2e^x + \sqrt{9}} = e^{2x^{1/2} + 2e^x} = e^{2x^{1/2} + 2e^x}$$

**b.**  $f(x) = \ln(\cos(x^3) - 4x^7)$ 

$$f'(x) = \frac{1}{\cos(x^3) - 4x^7} \cdot (-\sin(x^3) \cdot 3x^2 - 28x^2)$$

$$= \frac{3x^2 \sin(x^3) + 28x^2}{\cos(x^3) - 4x^7}$$

**c.**  $h(x) = \sin(kx^2 - 5)$  where k is a constant

$$h'(x) = \cos(kx^2-5)(2kx)$$

$$= (2kx\cos(kx^2-5))$$

## Math 252: Quiz 1

**d.**  $f(x) = \sec(xe^x)$ 

$$f(x) = Sec(xe^{x}) tan(xe^{x}) (1 \cdot e^{x} + x \cdot e^{x})$$

$$= (e^{x} (1+x) sec(xe^{x}) tan(xe^{x}))$$

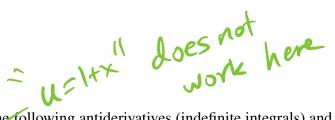
$$e. \ y = \frac{\cos(2x)}{x^5 + \pi}$$

$$\frac{dy}{dx} = \frac{(-s/n(2x)(x^{5}+\pi) - \cos(2x)(5x^{4})}{(x^{5}+\pi)^{2}}$$

f. Find  $\frac{dy}{dx}$  if  $e^y \cos(x) = xy + 1$ . You must solve for  $\frac{dy}{dx}$ .

$$\frac{dy}{dx}(e^{y}\cos(x)-x)=y+e^{y}\sin(x)$$

$$\frac{dy}{dx} = \frac{y + e^{y} \sin(x)}{e^{y} \cos(x) - x}$$



Math 252: Quiz 1

- 1 September, 2022
- **2.** [12 points] Compute the following antiderivatives (indefinite integrals) and definite integrals. Remember that antiderivatives need a "+C".

a. 
$$\int \frac{(1+x)^2}{2x} dx = \int \frac{1+2x+x^2}{2x} dx = \int \frac{1}{2} \frac{1}{x} + 1 + \frac{1}{2} x dx$$

$$= \left(\frac{1}{2} \ln|x| + x + \frac{x^2}{4} + c\right)$$

Math 252: Quiz 1 **d**.  $\int x\sqrt{x+5} dx$  $= \int u^{3/2} - 5 u^{1/2} du$ Cos(u)du = (Sin (lanx)+c = Sin(u)+C

$$\frac{1}{1} \int \frac{\sec^2(x)}{\tan^2(x)} dx$$

$$= \int \frac{du}{u^2} = \int u^{-2} du \qquad \left[ u = \tan x \right]$$

$$= -u^{-1} + c = -\left( \tan x \right)^{-1} + c$$

$$= -\cot x + c$$

$$= \cot x + c$$

$$= \cot x + c$$