Math 252: Quiz 1

Name:

SOLUTIONS

1 September, 2022

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

$$f'(x) = \frac{1}{\cos(x^3) - 4x^7} \cdot \left(-\sin(x^3)3x^2 - 28x^6\right)$$

$$= \frac{3x^2\sin(x^3) + 28x^6}{\cos(x^3) - 4x^7}$$

$$= \cos(x^3) - 4x^7$$

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

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

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

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

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

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

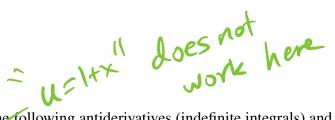
e.
$$y = \frac{\cos(2x)}{x^5 + \pi}$$

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

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

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

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



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- **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

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

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

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

$$= -\cot x + c$$

$$= \cot x + c$$

$$= \cot x + c$$