

NAME:

Solutions

MATH 172, Section 501; 09/04/2019

Quiz 1

Show your work! You may not use calculators, notes or books.

1. Given the function  $y(x)$  below, find  $y'(x)$ :

$$y(x) = \int_{\sin(x)}^1 \sqrt{1+t^2} dt.$$

Which theorem are you using here? Fundamental Theorem of Calculus I or FTC1 (1pt.)

$$y'(x) = \frac{d}{dx} \left( - \int_1^{\sin(x)} \sqrt{1+t^2} dt \right) \quad + \underline{1 \text{ pt.}} \text{ for inverting the bounds w/ minus sign}$$

$$= - \underbrace{\sqrt{1+\sin^2(x)}}_{\underline{1 \text{ pt.}}} \cdot \underbrace{\cos(x)}_{\underline{2 \text{ pts. (Chain Rule)}}$$

2. Find the antiderivative below:

$$\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx = \int e^u \cdot 2du = 2e^u + c = \boxed{2e^{\sqrt{x}} + c}$$

$$u = \sqrt{x} \quad \underline{1 \text{ pt.}} \text{ - correct substitution}$$

$$du = \frac{1}{2\sqrt{x}} dx \quad \underline{1 \text{ pt.}}$$

$$2du = \frac{1}{\sqrt{x}} dx$$

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Show your work! You may not use calculators, notes or books.

1. Given the function  $y(x)$  below, find  $y'(x)$ :

(5 pts.)

$$y(x) = \int_{\sqrt{x}}^{\pi/4} \theta \tan(\theta) d\theta.$$

Which theorem are you using here? Fundamental Theorem of Calculus (I) or FTC 1 (1 pt.)

$$y'(x) = \frac{d}{dx} \left( - \int_{\pi/4}^{\sqrt{x}} \theta \tan(\theta) d\theta \right) \quad + \underline{1 \text{ pt.}} \text{ for inverting the bounds w/ minus sign}$$

$$= - \left( \sqrt{x} \tan(\sqrt{x}) \right) \cdot \frac{1}{2\sqrt{x}} \quad \left. \vphantom{\frac{1}{2\sqrt{x}}} \right\} \underline{2 \text{ pts.}} \text{ (Chain Rule)}$$

$$= \boxed{-\frac{1}{2} \tan(\sqrt{x})}$$

(5 pts.)

2. Find the antiderivative below:

$$\int \sin(x) \cos(\cos(x)) dx = \int \cos(u) \cdot (-du) = - \int \cos(u) du = -\sin(u) + C$$

$$u = \cos(x)$$

$$du = -\sin(x) dx$$

$$-du = \sin(x) dx$$

1 pt. (Correct substitution)

1 pt.

$$= \boxed{-\sin(\cos(x)) + C}$$

1 pt. - final answer in x.

1 pt. correct integral in u  
1 pt. correct antideriv. in u