

Mathematics Department

MATH 141 - Worksheet #5

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.Name: _____

Ex [1] Find the derivative of the following functions

$$\text{a) } y = \int_2^{\sec x} \left(t - \frac{1}{t} \right) dt \quad \frac{dy}{dx} = ??$$

$$\text{b) } y = x^2 \int_2^{x^2} \cos(t^3) dt \quad \frac{dy}{dx} = ??$$

$$\text{c) } y = \int_{\cot x}^0 (1+t^2) dt \quad \frac{dy}{dx} \Big|_{x=\frac{\pi}{4}} = ??$$

Ex [2] Calculate the following integral

$$\text{a) } \int_0^1 2x \sqrt{x^2 + 1} dx$$

$$\text{b) } \int \sin^2(7x) dx$$

$$\text{c) } \int \frac{1}{x^2} \sin\left(\frac{1}{x}\right) \cos\left(\frac{1}{x}\right) dx$$

Hint: $\sin(2x) = 2 \sin x \cos x$

$$\text{d) } \int_{\pi/2}^{\pi} \frac{\sin 2x}{2 \sin x} dx$$

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Ex 3 Find the area of the region enclosed between the following function

$$x = y^2 \quad \& \quad x = y + 2$$

Short Answers - Worksheet #5

Ex 1 (a) $\frac{dy}{dx} = \tan^3 x$

(b) $\frac{dy}{dx} = 2x^3 \cos(x^6) + 2x \int_2^{x^3} \cos(t^3) dt$

(c) $\left. \frac{dy}{dx} \right|_{x=\frac{\pi}{4}} = 4$

Ex 2 (a) $\frac{2}{3} \begin{bmatrix} 2\sqrt{2} & -1 \end{bmatrix}$

(b) $\frac{x}{2} - \frac{\sin(14x)}{2.8} + C$

(c) $\frac{1}{4} \cos\left(\frac{2}{x}\right) + C$

(d) -1

Ex 3 Area = $\frac{9}{2}$