

Chapter 5 Test

Name Key

Find the derivatives of the following.

$\frac{e^{x^2} (2x)}{1}$  1.  $y = e^{x^2}$

$\frac{1 - 2 \ln x}{x^3}$  2.  $y = \frac{\ln x}{x^2}$

$\frac{x}{\ln 5 (x^2 + 4)}$  3.  $y = \log_5 \sqrt{x^2 + 4}$

$\frac{\frac{x}{4+x^2} - \frac{1}{x}}{1}$  4.  $y = \ln \frac{\sqrt{4+x^2}}{x}$

$\frac{2 \ln 5 \cdot 5^{2x+3}}{1}$  5.  $y = 5^{2x+3}$

$\frac{-3}{\sqrt{e^{6x}-1}}$  6.  $y = \operatorname{arccsc}(e^{3x})$

$\frac{-5y}{1}$  7.  $\ln y + 5x = 30$

$\frac{-2t}{\sqrt{1-t^4}}$   ~~$\cos(\arccos(t^2))$~~  8.  $y = \sin(\arccos(t^2))$  or  $\frac{-2t^3}{\sqrt{1-t^4}}$

$x^{\cos x} \left[ \frac{\cos x}{x} - \ln x \sin x \right]$  9.  $y = x^{\cos x}$

Integrate the following.

10.  $\int (\sec 4x + \tan 4x) dx$

11.  $\int \frac{1}{6x-1} dx$

$\frac{1}{4} \ln |\sec 4x + \tan 4x| - \frac{1}{4} \ln |\cos 4x| + C$

$\frac{1}{6} \ln |6x-1| + C$

$$12. \int \frac{x^2 - 2}{x + 1} dx$$

$$- \ln 3$$

$$13. \int \frac{(1 + \ln x)^2}{x} dx$$

$$\frac{7}{3}$$

$$14. \int \frac{1}{\sqrt{-x^2 - 4x}} dx$$

$$\arcsin\left(\frac{x+2}{2}\right) + C$$

$$15. \int \frac{x}{16 + x^2} dx$$

$$\frac{1}{2} \ln |16 + x^2| + C$$

$$16. \int \frac{dx}{16 + x^2}$$

$$\frac{\pi}{16}$$

$$17. \int \frac{x}{\sqrt{1 - x^4}} dx$$

$$\frac{1}{2} \arcsin x^2 + C$$

18.  $\int x e^{-3x^2} dx$

$$-\frac{1}{6} e^{-3x^2} + C$$

19.  $\int \frac{3}{x\sqrt{9x^2-4}} dx$

$$\frac{3}{2} \operatorname{arccsc}\left(\frac{3x}{2}\right) + C$$

20. Find any relative extrema and inflection points for  $y = x \ln x$

$$x = \frac{1}{e} \text{ rel min}$$

$x = 0$  ~~pt~~ of inflection but not in domain