Chapter 5 Review – Please work on separate paper!

1. Find the derivative: $f(x) = \ln \dfrac{\sqrt{x^2+1}}{x(2x^3-1)^2}$.

(a) $\dfrac{x}{x^2+1} - \dfrac{1}{x} + \dfrac{12x^2}{2x^3-1}$ (b) $\dfrac{x}{x^2+1} - \dfrac{1}{x} + \dfrac{6x^2}{2x^3-1}$ (c) $\dfrac{1}{(x^2+1)^{1/2}(4x^2)(2x^3-1)}$

(d) $\dfrac{x}{x^2+1} - \dfrac{1}{x} - \dfrac{12x^2}{2x^3-1}$ (e) None of these

2. Differentiate: $y = x^{1-x}$.

(a) $y' = (1-x)x^{-x}$ (b) $y' = x^{1-x}\left[\dfrac{1-x}{x} - \ln x\right]$ (c) $y' = (x-1)x^{-x}$

(d) $y' = x^{1-x}\left(-\dfrac{1}{x}\right)$ (e) None of these

3. Find $\dfrac{dy}{dx}$ if $xe^y + 1 = xy$.

(a) 0 (b) $\dfrac{y - e^y}{xe^y - x}$ (c) $\dfrac{y}{e^y - x}$

(d) $\dfrac{e^y}{xe^y - 1}$ (e) None of these

4. Find y' if $y = \dfrac{x^3}{3^x}$.

(a) $\dfrac{x}{3^{x-2}}$ (b) $\dfrac{3x^2}{3^x(\ln 3)}$ (c) $\dfrac{x^2(9-x^2)}{3^{x+1}}$

(d) $\dfrac{x^2[3 - x(\ln 3)]}{3^x}$ (e) None of these

7. Evaluate $\displaystyle\int_1^{5e} \frac{1}{x}\,dx$.

(a) $\dfrac{1}{5e} - 1$ (b) 0 (c) ∞

(d) $1 + \ln 5$ (e) None of these

9. Evaluate $\displaystyle\int \tan 3x\,dx$.

(a) $\frac{1}{3}\ln|\sec 3x| + C$ (b) $3\sec^2 3x + C$ (c) $\frac{1}{3}\sec^2 3x$

(d) $\ln|\cos 3x| + C$ (e) None of these

10. Evaluate $\displaystyle\int \frac{e^{1/(x+1)}}{(x+1)^2}\,dx$.

(a) $\dfrac{e^{1/(x+1)}}{2(x+1)} + C$ (b) $\dfrac{e^{-x/(x+1)}}{(x+1)^2} + C$ (c) $-e^{1/(x+1)} + C$

(d) $\dfrac{e^{-x/(x+1)}}{(x+1)^2}$ (e) None of these

12. Evaluate $\int \frac{\sin^2 x - \cos^2 x}{\sin x}\,dx$.

(a) $-2\cos x + \ln|\csc x + \cot x| + C$

(b) $-\ln|\csc x + \cot x| + C$

(c) $-\sec x + C$

(d) $\cos x + \ln|\csc x + \cot x| + C$

(e) None of these

14. Determine whether $f(x) = \frac{x-b}{a}$ is one-to-one; if it is, find f^{-1}.

(a) f is not one-to-one.

(b) $f^{-1}(x) = ax + b$

(c) $f^{-1}(x) = \frac{a}{x-b}$

(d) $f^{-1}(x) = \frac{x-a}{b}$

(e) None of these

15. Find an equation for the tangent line at the point where $x = 2$ on the graph of the function $f(x) = 5^{x/2}$.

(a) $y = \frac{5}{2}x + 3$

(b) $y = \frac{5}{2}x + 5$

(c) $y = \frac{5}{2}[(\ln 5)x - 2\ln 5]$

(d) $y = \frac{5}{2}[(\ln 5)x - 2\ln 5 + 2]$

(e) None of these

1. Find the derivative: $f(x) = \ln \frac{x^2\sqrt{4x+1}}{(x^3+5)^3}$.

(a) $\frac{x}{9x^2(x^3+5)^2\sqrt{4x+1}}$

(b) $\frac{2}{x} + \frac{2}{4x+1} - \frac{9x^2}{x^3+5}$

(c) $\frac{2}{x} + \frac{1}{2(4x+1)} - \frac{3}{x^3+5}$

(d) $\frac{2}{x} - \frac{2}{4x+1} - \frac{9x^2}{x^3+5}$

(e) None of these

2. Differentiate: $y = x^{e^x}$.

(a) $y' = e^x x^{e^x - 1}$

(b) $y' = e^x$

(c) $y' = x^{e^x}\left[\frac{e^x}{x} + (\ln x)(e^x)\right]$

(d) $y' = xe^x + e^x$

(e) None of these

3. Find $\frac{dy}{dx}$ if $\ln(xy) = x + y$.

(a) $-\frac{y}{x}$

(b) e^{x+y}

(c) $\frac{xy}{1-xy}$

(d) $\frac{xy - y}{x - xy}$

(e) None of these

4. Find y' if $y = 3^x x^3$.

(a) $3^x x^2[3 + (\ln 3)x]$

(b) $2x^2 3^{x-1}$

(c) $3^{x-1}x^2[9 + x^2]$

(d) $9x^2$

(e) None of these

7. Evaluate $\int_e^{4e} \frac{1}{x}\,dx$.

(a) $\ln 3e$ (b) $\ln 4$ (c) $-\frac{3}{4e}$

(d) $\frac{15}{16e^2}$ (e) None of these

8. Evaluate $\int \frac{2x+1}{x+1}\,dx$.

(a) $2x - \ln|x+1| + C$ (b) $2x + C$ (c) $x^2 + \ln|x+1| + C$

(d) $\frac{2x^2+2x}{x^2+2x} + C$ (e) None of these

10. Evaluate $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}\,dx$.

(a) $2e^{\sqrt{x}} + C$ (b) $\frac{1}{2}e^{\sqrt{x}} + C$ (c) $\sqrt{x}\,e^{\sqrt{x}} + C$

(d) $\sqrt{x}\,e^{\sqrt{x}+1} + C$ (e) None of these

12. Evaluate $\int \frac{\cos^3 x - \sin^2 x}{\cos^2 x}\,dx$.

(a) $\frac{\cos^2 x}{2} - \tan x + x + C$ (b) $\sin x - \sec x + C$ (c) $\sin x - \tan x + x + C$

(d) $\sin x - \frac{\tan^3 x}{3} + C$ (e) None of these

14. If the slope of a strictly monotonic function f is $\frac{4}{9}$ at a particular point (a, b), what is the slope of f^{-1} at the point (b, a)?

(a) $\frac{9}{4}$ (b) -5 (c) $\frac{4}{9}$ (d) 5 (e) None of these

15. Find $f(x)$ if $f'(x) = (\ln 4)x4^{x^2}$ and $f(0) = 5$.

(a) $f(x) = 2^{x^2} + 4$ (b) $f(x) = 4^{x^2} + 4$ (c) $f(x) = \frac{4^{x^2}}{2} + \frac{9}{2}$

(d) $f(x) = \frac{1}{2}(\ln 4)x^2 4^{x^3/3} + 5$ (e) None of these

Answers to CHAPTER 5

1. d	**2.** b	**3.** b	**4.** d
		7. d	
9. a	**10.** c		**12.** a
	14. b	**15.** d	

1. b	**2.** c	**3.** d	**4.** a
		7. b	**8.** a
	10. a		**12.** c
	14. a	**15.** c	