

CALCULUS I – Worksheet #7

For problems 1 – 8, find $\frac{dy}{dx}$.

1. $y = \frac{2-x}{3x+1}$ (A) $\frac{-7}{(3x+1)^2}$ (B) $\frac{(6x+5)}{(3x+1)^2}$ (C) $\frac{-9}{(3x+1)^2}$ (D) $\frac{7}{(3x+1)^2}$ (E) $\frac{(7-6x)}{(3x+1)}$

2. $y = \ln \frac{e^x}{e^x-1}$ (A) $x - \frac{e^x}{e^x-1}$ (B) $\frac{1}{e^x-1}$ (C) $\frac{1}{1-e^x}$ (D) 0 (E) $\frac{e^x-2}{e^x-1}$

3. $y = \tan^{-1} \left(\frac{x}{2} \right)$ (A) $\frac{4}{4+x^2}$ (B) $\frac{1}{2\sqrt{4-x^2}}$ (C) $\frac{2}{\sqrt{4-x^2}}$ (D) $\frac{1}{2+x^2}$ (E) $\frac{2}{x^2+4}$

4. $y = \cos^2 x$ (A) $-\sin^2 x$ (B) $2\sin x \cos x$ (C) $-\sin(2x)$ (D) $2\cos x$ (E) $-2\sin x$

5. $y = x^{\ln x}$ (A) $\frac{2}{x}$ (B) $\frac{2\ln x}{x}$ (C) $\frac{2y \ln x}{x}$ (D) $\frac{2y}{x}$ (E) $(\ln x)x^{\ln x-1}$

6. $y = x(\ln^3 x)$ (A) $\frac{3\ln^2 x}{x}$ (B) $3\ln^2 x$ (C) $3x\ln^2 x + \ln^3 x$ (D) $3(\ln x + 1)$ (E) none

7. $x = t - \sin t$ and $y = 1 - \cos t$ (A) $\frac{\sin t}{1 - \cos t}$ (B) $\frac{1 - \cos t}{\sin t}$ (C) $\frac{\sin t}{\cos t - 1}$ (D) $\frac{1-x}{y}$ (E) $\frac{1 - \cos t}{1 - \sin t}$

8. $3x^2 - 2xy + 5y^2 = 1$ (A) $\frac{3x+y}{x-5y}$ (B) $\frac{y-3x}{5y-x}$ (C) $3x+5y$ (D) $\frac{3x+4y}{x}$ (E) None

9. If $f(x) = x^4 - 4x^2$, then $f^{(iv)}(2) =$ (A) 48 (B) 0 (C) 24 (D) 144 (E) None

10. If $y = x^2 + x$, then the derivative of y with respect to $\frac{1}{1-x}$ is

(A) $\frac{2x+1}{(x-1)^2}$ (B) $\frac{2x+1}{(x-1)^2}$ (C) $2x+1$ (D) $\frac{3-x}{(1-x)^3}$ (E) None

11. If $f(x) = \ln x$, then find $f^{(iv)}(x)$. Note: $f^{(iv)}(x)$ is the 4th derivative of $f(x)$.

12. If $y = \sqrt{x^2 + 1}$, then find the derivative of y^2 with respect to x^2 .

13. If $y = \sin x$, then find the derivative of y with respect to $\tan x$.

14. Find $\frac{dy}{dx}$: $y = \tan^{-1} \left(\frac{x}{2} \right)$

15. Find $\frac{dy}{dx}$: $y = \sin^{-1} \sqrt{x}$

16. Find $\frac{dy}{dx}$: $y = \sec^{-1} x^3$