

Chapter 4 Review (Sections 4.1, 4.2, 4.4, and 5.6)

For numbers 1-13: Find the derivative of the function.

1. $y = e^{3x-7}$

2. $y = \tan e^x$

3. $y = \sin^3 x$

4. $y = \ln(\csc x)$

5. $s = \cos(1 - 2t)$

6. $s = \cot \frac{2}{t}$

7. $y = \sqrt{1 + \cos x}$

8. $y = x\sqrt{2x + 1}$

9. $r = \sec(1 + 3\theta)$

10. $r = \tan^2(3 - \theta^2)$

11. $y = x^2 \csc 5x$

12. $y = \ln\sqrt{x}$

13. $y = \ln(1 + e^x)$

14. Let $xy = 10$. Find $\frac{dy}{dt}$ when $x = 8$ given that $\frac{dx}{dt} = 5$.

15. Let $y = 2(x^2 - 3x)$. Find $\frac{dy}{dx}$. Then find $\frac{dy}{dt}$ when $x = 3$ given that $\frac{dx}{dt} = 2$.

16. Find $\frac{d^2y}{dx^2}$ given $1 - xy = x - y$.

17. Find $\frac{dy}{dx}$ of the curve $y = \cos^3(x^2)$

18. Find the slope of the curve $y = \sqrt{x^2 + 1} \sin(2x)$

19. Find the velocity of the function if its position is $s(t) = 4x^2 \tan(x^3 - 1)$.

20. Assume x and y are both differentiable functions of time. If $3x - 4y^3 = -32$, find $\frac{dx}{dt}$ when $x = 0$ and $\frac{dy}{dt} = 3$.

21. Find the equation of the tangent line to $x^2y + 3x = y^2 + 1$ at the point $(1, -1)$.
22. Find $\frac{dy}{dx}$ for the following curve: $x^2y + y^2x = 2$.
23. Find the equation of the tangent line to the curve $y = x \sin 4x$ when $x = \pi$.
24. Find the slope of the curve $y^2 + yx + 3x - 6y = -3$ at the point(s) when $x = 1$.