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Place the number of the basic derivative formula (1 - 26 from the sheet of Derivative Formulas) next to each derivative problem below (you do not need to solve the problem):

- Given  $y = f(x)$ , determine  $\frac{dy}{dx}$ :
- |  |   |
|--|---|
| 1. $y = 8x$                              | 15. $y = (e^x)^x$                               |
| 2. $y = \sin^2 2x$                       | 16. $y = e^{3x}$                                |
| 3. $y = xe^{\cos x}$                     | 17. $y = e^x$                                   |
| 4. $y = \sin^{-1}(x^2)$                  | 18. $y = \frac{x^2}{e^{2x}}$                    |
| 5. $y = \sin(\ln(x^2))$                  | 19. $y = \ln(x)\sin(x)$                         |
| 6. $y = \ln(x^2 - 5)$                    | 20. $y = \ln(\sin(x))$                          |
| 7. $y = 5$                               | 21. $y = \tan^{-1}(\ln(3x^2 + 3) + 8x)$         |
| 8. $y = \tan(3x^2)$                      | 22. $y = x^x$                                   |
| 9. $y = 3x^{-1} + 12x$                   | 23. $y = \pi^x$                                 |
| 10. $y = e^{\cos(x)}$                    | 24. $y = \pi^x$                                 |
| 11. $y = \tan^{-1}(\ln x)$               | 25. $y = x^x$                                   |
| 12. $y = \sec^{-1}(3x)$                  | 26. $y = \frac{\sin(3x)}{\sqrt{x^2 - 5}}$       |
| 13. $y = \cot x$                         | 27. $y = \cot^{-1}\left(\frac{1}{1+x^2}\right)$ |
| 14. $y = x \cos\left(\frac{1}{x}\right)$ | 28. $y = 3x^2 - \cos^{-1}x$                     |

22)  $y = x^7 - 7x$

24)  $y = 4x^6 - 2x^4 + \frac{1}{x^2}$

**Differentiation Class XII  
Worksheet - 1**

1. Find  $\frac{dy}{dx}$  when  $y = \sin u$ ,  $u = e^{\sqrt{t}}$  and  $t = \log x$ .

2. Find the derivatives of the following functions at any point of their domains :

- |                        |   |                            |   |
|------------------------|---|----------------------------|---|
| (i) $\sec(2x + 3)$     | (ii) $\sin 2x + (2x + 5)^2$             | (iii) $\cos x^2$           | (iv) $\cos(\log x)$                         |
| (v) $e^{\cos x + 2}$   | (vi) $e^{x^2}$                          | (vii) $\log \sin x $       | (viii) $\sqrt{1 + \tan x}$                  |
| (ix) $\cos(1 - x^2)^2$ | (x) $\sqrt{\frac{1+x}{1-x}}$            | (xi) $e^x \cot x$          | (xii) $\sin^n(ax^2 + bx + c)$ , $n \neq -1$ |
| (xiii) $2^{\cos^2 x}$  | (xiv) $\sin \sqrt{x} + \cos^2 \sqrt{x}$ | (xv) $\sec(\tan \sqrt{x})$ |   |

3. Differentiate the following functions w.r.t.  $x$  :

- |                                 |                          |                                       |                                       |
|---------------------------------|--------------------------|---------------------------------------|---------------------------------------|
| (i) $\frac{x^3 - 8}{(x + 2)^3}$ | (ii) $\sin 2x \cos 3x$   | (iii) $\frac{\sin^2 x}{1 + \cos^2 x}$ | (iv) $\frac{1}{\log(\cos x)}$         |
| (v) $\frac{\sin 2x}{e^x}$       | (vi) $\frac{x}{\sin 3x}$ | (vii) $\frac{e^x + \log x}{\sin 3x}$  | (viii) $\frac{\sin x + x^2}{\cot 2x}$ |

4. Differentiate the following functions w.r.t.  $x$  :

- |                                     |  |  |                                     |
|-------------------------------------|--|--|-------------------------------------|
| (i) $\frac{1 - \cos x}{1 + \cos x}$ | (ii) $\sqrt{\frac{1 - \cos x}{1 + \cos x}}$                      | (iii) $\sqrt{\frac{1 - \tan x}{1 + \tan x}}$     | (iv) $\frac{\sin x}{\sqrt{\cos x}}$ |
| (v) $\log(\sec x + \tan x)$         | (vi) $\sin(\sqrt{\sin x + \cos x})$                              | (vii) $\sqrt{\cos(1 + x^2)}$                     | (viii) $\tan^2(\sqrt{x^4 + 3})$     |
| (ix) $\cos \frac{x}{x+1}$           | (x) $\sqrt{\log\left(\sin\left(\frac{x^2}{3} - 1\right)\right)}$ | (xi) $\log \sqrt{\frac{1 - \sin x}{1 + \sin x}}$ | (xii) $\sin(\log(\log 3x))$         |
| (xiii) $\sqrt{\tan \sqrt{x}}$       | (xiv) $\cos x^3 \sin^2(x^5)$                                     | (xv) $2\sqrt{\cot(x^2)}$                         |                                     |

5. Differentiate the following functions :

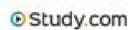
- |  |   |  |  |
|--|---|--|--|
| (i) $\sin^p x \cos^q x$  | (ii) $e^{ax} \cos(bx + c)$  | (iii) $\frac{e^{2x} - 1}{e^{2x} + 1}$    | (iv) $\frac{e^{2x} - e^{-2x}}{e^{2x} + e^{-2x}}$ |
| (v) $\left(\frac{2x^3 + 1}{3x^2 + 1}\right)^2$                 | (vi) $\frac{x}{a - \sqrt{a^2 - x^2}}$   | (vii) $\frac{(x^5 - 2x + 1)^{3/2}}{x^2}$ | (viii) $(x + \sqrt{x^2 + 1})^n$                  |
| (ix) $\frac{\sqrt{a+x} - \sqrt{a-x}}{\sqrt{a+x} + \sqrt{a-x}}$ | (x) $\frac{\sqrt{x^2 + 1} + \sqrt{x^2 - 1}}{\sqrt{x^2 + 1} - \sqrt{x^2 - 1}}$ |  |  |

6. Differentiate the following functions w.r.t.  $x$  :

- |                            |                                   |  |                               |
|----------------------------|-----------------------------------|--|-------------------------------|
| (i) $\sqrt{\sin \sqrt{x}}$ | (ii) $\sin(e^x \log x)$           | (iii) $x \log x \log(\log x)$  | (iv) $\sqrt{\frac{1-x}{1+x}}$ |
| (v) $\log \frac{1+x}{1-x}$ | (vi) $\log(x + \sqrt{x^2 + a^2})$ | (vii) $\log\left(\frac{\sqrt{x+a} + \sqrt{x-a}}{\sqrt{x+a} - \sqrt{x-a}}\right)$ |                               |



<http://study.com/academy/practice/quiz-worksheet-using-the-rules-of-differentiation-to-calculate-derivatives.html>



**Quiz & Worksheet - Using the Rules of Differentiation to Calculate Derivatives**

1. Find the derivative of  $f(x)$ .

$f(x) = \frac{e^x}{1 + \sin(x)}$

- $f'(x) = \frac{1 + \sin(x) - \cos(x)e^x}{(1 + \sin(x))^2}$
- $f'(x) = \frac{2}{(1 + \sin(x))^2} e^x$
- $f'(x) = \frac{\cos(x) - 1 - \sin(x)e^x}{(1 + \sin(x))^2}$
- $f'(x) = \frac{e^x}{\cos(x)}$

2. Find the derivative of  $p(t)$ .

$p(t) = e^{t^{3.14}}$

- $p'(t) = e^t (e^{3.14} + 3.14t^{2.14})$
- $p'(t) = e^t t^{2.14} + 3.14$
- $p'(t) = e^t t^{3.14} + 3.14t^{2.14}$
- $p'(t) = 3.14e^t t^{2.14}$

3. Evaluate.

$\frac{d^2}{dx^2}(e^x + \sin(x))$

- $e^x - \sin(x)$
- $e^x + \sin(x)$
- $e^x + \cos(x)$
- $e^x - \cos(x)$

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