Differentiation and its Applications-Set1

24-12-2020

1. Calculate the derivatives with respect to x:
   (a) $\sin x$
   (b) $\tan x$
   (c) e^x
   (d) $log_e(x)$
   (e) x^5

2. Calculate the following derivatives:
   (a) $\frac{d}{dx}[(x+2)^2]$
   (b) $\frac{d}{dx}[\sin(x) + \cos(x)]$
   (c) $\frac{d}{dx}[e^x + 4x^3 + 5]$

3. Calculate the following derivatives using product rule:
   (a) $\frac{d}{dx}[e^x \sin x]$
   (b) $\frac{d}{dx}[2\sin x \cos x]$
   (c) $\frac{d}{dx}[x \sin(x)]$

4. Calculate the following derivatives using quotient rule:
   (a) $\frac{d}{dx}[\frac{\sin x}{\cos x}]$
   (b) $\frac{d}{dx}[\frac{x^2 + e^x}{3\cos(x)}]$

5. Calculate the following derivatives using chain rule:
   (a) $\frac{d}{dx}[\sin(2x)]$
   (b) $\frac{d}{dx}[e^{x^2}]$
   (c) $\frac{d}{dx}[(3x+4)^{25}]$

6. Calculate the derivatives of the following expressions:
   (a) $\log(x + 2 + \sqrt{x^2 + 4x + 1})$
   (b) $\frac{\sin(x^2 \sin(x))}{\sqrt{1 + (2x+3)^2}}$

7. Calculate $\frac{dy}{dx}$ using the following:
   (a) $x^2 + 2xy + y^3 = 42$

8. Find $\frac{dy}{dx}$ if x=sin(y). Give your final result in terms of x only.
   Can you find the derivative of $\sin^{-1}(x)$ wrt x? It's the same thing as $\frac{dy}{dx}$ since $y = \sin^{-1}(x)$.

9. Find the derivative of the following wrt x:
   (a) $\tan^{-1}(m \sin(x))$
   (b) $\sin^{-1}(\frac{2x}{1+x^2})$, $x \in (-1, 1)$