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) $\frac{d}{dx} \left[\frac{\sin x}{\cos x} \right]$ (b) $\frac{d}{dx} \left[\frac{x^2 + e^x}{3\cos(x)} \right]$
- 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) $\sin^{-1}(\frac{2x}{1+x^2}), x \in (-1,1)$