

Series 3: Higher Derivatives

Given that $y = \ln(1 - x)$, find the value of $\frac{d^3y}{dx^3}$ when $x = 1$.

$$f(x) = e^{x^2}$$

a. Show that $f'(x) = 2xf(x)$.

b. By differentiating the result in part a. twice more with respect to x , show that:

i. $f''(x) = 2f(x) + 2xf'(x)$

ii. $f'''(x) = 2xf''(x) + 4f'(x)$

c. Deduce the values of $f'(0)$, $f''(0)$ and $f'''(0)$.