DERIVATIVES OF LOGARITHMIC FUNCTIONS

1 Differentiate:

(a) $\log_e 2x$ **(b)** $2\log_e x$ **(c)** $\log_e x^2$

(d) $\log_e (3x-5)$ **(e)** $\log_e x + 3$ **(f)** $x^2 - \log_e (4x-1)$

3 The derivative of $\log_e(3x^2+1)$ is:

A $6x$ **B** $\frac{6}{x}$ **C** $\frac{6x}{3x^2+1}$ **D** $\frac{1}{x^3+x}$

4 Differentiate:

(a) $x\ln x$ **(b)** $x^3\ln x$ **(c)** $(x+2)\ln(x+2)$ **(d)** $(x^2+1)\ln 2x$

DERIVATIVES OF LOGARITHMIC FUNCTIONS

(i) $\dfrac{\log_e x}{x}$ (j) $\dfrac{\log_e x}{e^x}$ (k) $\dfrac{\log_e\left(x^2+1\right)}{x}$ (l) $e^x\log_e(e^x+1)$

7 If $f(x) = \log_e x$, find: **(a)** $f'(x)$ **(b)** $f''(x)$ **(c)** $f'(2)$ **(d)** $f''(2)$

8 Find the equation of the tangent and normal to the curve $y = \log_e x$ at the point where it crosses the x-axis.

12 Solve: **(a)** $e^x = 2$ **(b)** $e^{3x} = 5$ **(c)** $e^{2x+3} = 7$ **(d)** $e^{x^2-1} = 10$

13 Differentiate:

(a) $y = \log_e\left(\dfrac{x^3-1}{x}\right)$ **(b)** $f(x) = \log_e\left(e^x(x+2)\right)$ **(c)** $y = \log_e\left(\sqrt{x}(x+1)^5\right)$

15 Differentiate:

(a) a^{-x} **(b)** $a^x \log_a x$ **(c)** $\dfrac{\log_a x}{a^x}$ **(d)** $\sqrt{\log_a x}$