

SATPREP

Calculus

1. Let $g(x) = \frac{\ln x}{x^2}$, for $x > 0$.

(a) Use the quotient rule to show that $g'(x) = \frac{1 - 2 \ln x}{x^3}$.

(b) The graph of g has a maximum point at A. Find the x -coordinate of A.

2. Let $h(x) = \frac{6x}{\cos x}$. Find $h'(0)$.

3. Let $f(x) = e^{-3x}$ and $g(x) = \sin\left(x - \frac{\pi}{3}\right)$.

(a) Write down

(i) $f'(x)$;

(ii) $g'(x)$.

(b) Let $h(x) = e^{-3x} \sin\left(x - \frac{\pi}{3}\right)$. Find the exact value of $h'\left(\frac{\pi}{3}\right)$.

4. A gradient function is given by $\frac{dy}{dx} = 10e^{2x} - 5$. When $x = 0$, $y = 8$. Find the value of y when $x = 1$.

5. Let $g(x) = 2x \sin x$.

(a) Find $g'(x)$.

(b) Find the gradient of the graph of g at $x = \pi$.

6. Let $f(x) = e^x \cos x$. Find the gradient of the normal to the curve of f at $x = \pi$.

7. The graph of $y = \sqrt{x}$ between $x = 0$ and $x = a$ is rotated 360° about the x -axis. The volume of the solid formed is 32π . Find the value of a .