2 Differentiate $x^2 e^{3x}$ with respect to x. [3]

3 In this question you may use the values in the table below.

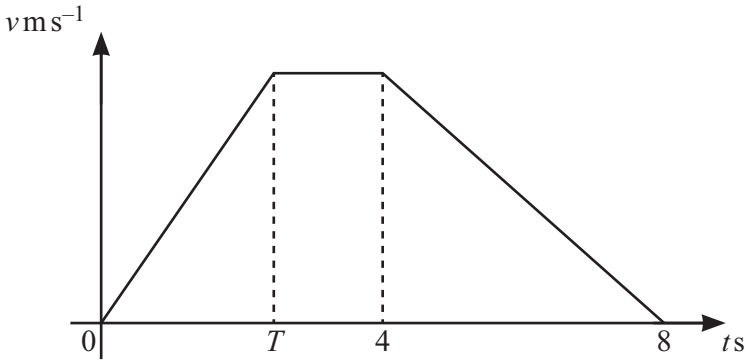
θ radians	$\sin\theta$	$\cos\theta$	$\tan\theta$
$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$

Variables x and y are related by the equation $y = \sin 5x$ where $0 \leqslant x \leqslant \frac{\pi}{10}$.

Use calculus to find the approximate change in x when y increases from $\frac{\sqrt{3}}{2}$ by the small amount 0.01. [4]

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4



The velocity–time graph represents the motion of a particle moving in a straight line.
The acceleration during the first T seconds of the motion is $2\,\text{m s}^{-2}$.
The total distance travelled is 27 m.

(a) Calculate T. [4]

(b) Calculate the acceleration during the last 4 seconds of the motion. [2]

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