

January 2013. Test 1. Solutions.

Q1 (a) $v = \sqrt{\frac{2khd}{4ml+d}}$

(b) $(\sqrt{g} + kw)(\sqrt{g} - kw)$
Difference between 2 squares.

(c) $I_1 = 0.05$ $I_2 = 0.073$

(d) 2

Q2 (a) $(x-2)(x+1)$

$\frac{4}{3(x-2)} + \frac{2}{3(x+1)}$

(b) $AB = 2.468 \text{ m}$

(c) (i) $67.5^\circ, 157.5^\circ, 247.5^\circ, 337.5^\circ$

(ii) $45^\circ, 135^\circ, 225^\circ, 315^\circ$

Q3 (a) (i) 1 (ii) $-8 \ln 2x e^{6.2x}$

(iii) $x + 2x \ln x$ (iv) $-\frac{(1+\ln x)}{(1+\ln x)^2}$ i.e. $-\frac{1}{(1+\ln x)}$

(b) $\frac{dx}{dt} = -3 \ln 3t - 3 \cos 3t$ $\frac{d^2x}{dt^2} = -9 \cos 3t + 9 \sin 3t$

(c) $\frac{4}{(2x-3)} - \frac{1}{2(x-5)}$

4 (a) $\frac{\partial z}{\partial x} = 3x^2 - 3y$ $\frac{\partial z}{\partial y} = 3y^2 - 3x$ $\frac{\partial^2 z}{\partial x^2} = 6x$

$\frac{\partial^2 z}{\partial y^2} = 6y$ $\frac{\partial^2 z}{\partial x \partial y} = -3$

Value of expression $36xy - 9$

(b) $x = 0.13$ and $x = -6.80$

(c) -22

