

### 'A New Renewable'

$$\text{a) } A = 10e^{-0.05t} \cos 10t$$

$$\frac{dA}{dt} = e^{-0.05t}(-100\sin 10t - 0.5\cos 10t)$$

$$0 = e^{-0.05t}(-100\sin 10t - 0.5\cos 10t)$$

$$-100\sin 10t = 0.5\cos 10t$$

$$\frac{\sin 10t}{\cos 10t} = -\frac{1}{200}$$

$$\tan 10t = -\frac{1}{200}$$

[4 marks]

$$\text{b) let } 10e^{-0.05t} = 1$$

$$-0.05t = \ln \frac{1}{10}$$

$$t = 46.05$$

Find the solution to  $\tan 10t = -\frac{1}{200}$  closest to (but smaller than) 46.05  $t =$

$$45.238, 45.553, 45.867, 46.181$$

Therefore  $t = 45.9$ (3s. f.)

[4 marks]