$$A = \frac{1}{2} ab \sin\theta$$

$$\frac{dA}{dt} = \frac{1}{2}\left(\frac{da}{dt} b\sin\theta + \frac{db}{dt} a\sin\theta + \cos\theta \frac{d\theta}{dt} ab \right)$$

$$\frac{dA}{dt} = \frac{1}{2}\left(b\sin\theta \frac{da}{dt} + a\sin\theta \frac{db}{dt} + ab\cos\theta \frac{d\theta}{dt} \right)$$

#5)

$$S = \sqrt{x^2 + y^2 + z^2}$$

$$\frac{dS}{dt} = \frac{1}{2}\left(x^2 + y^2 + z^2\right)^{-\frac{1}{2}}\left(2x\frac{dx}{dt} + 2y\frac{dy}{dt} + 2z\frac{dz}{dt}\right)$$

$$\frac{dS}{dt} = \frac{2x\frac{dx}{dt} + 2y\frac{dy}{dt} + 2z\frac{dz}{dt}}{2\sqrt{x^2 + y^2 + z^2}}$$

#4a]

$$P = RI^2$$

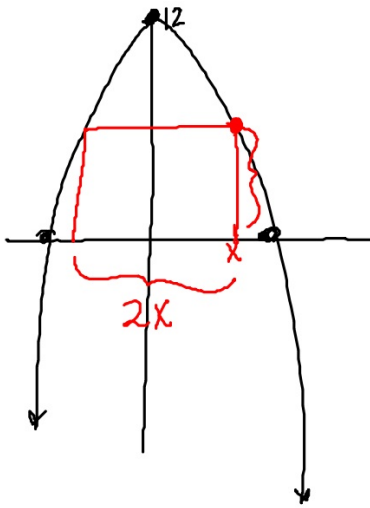$$\frac{dP}{dt} = 2RI\frac{dI}{dt} + I^2\frac{dR}{dt}$$

#4b]

$$P = RI^2$$

$$0 = R\cdot 2I\frac{dI}{dt} + I^2\cdot\frac{dR}{dt}$$

$$\frac{-2RI\frac{dI}{dt}}{I^2} = \frac{I^2\frac{dR}{dt}}{I^2}$$

$$\frac{dR}{dt} = \frac{-2R}{I}\frac{dI}{dt}$$

12

$y=12-x^2$

2x

x

$b=2(2)=4$

$h=12-(2)^2=12-4=8$

$A=bh$

$A=2x(12-x^2)$

$A=24x-2x^3$

$A'=24-6x^2$

$24=6x^2$

$x^2=4$

$x=2$