velocity at the end of five seconds.
[**Ans:** 4 rev/s^2, 20 rev/s]

$\Delta\theta = 50$ rev
$\Delta\theta = 50 \times 2\pi$ rad
$\Delta\theta = 100\pi$ rad
$\alpha = ?$, $\omega = ?$

$\Delta\theta = \omega_0 t + \frac{1}{2}\alpha t^2$

$100\pi = 0 + \frac{1}{2} \cdot \alpha \cdot (5)^2$

$200\pi = 25\alpha \Rightarrow \alpha = \frac{200\pi}{25} = 8\pi$ rad/s^2

$\alpha = \frac{8\pi}{2\pi}$ rev/s^2 $\Rightarrow$ $\alpha = 4$ rev/s^2

$\omega = \omega_0 + \alpha t \Rightarrow \omega = 0 + 8\pi \times 5 \Rightarrow \omega = 0 + 40\pi$

$\omega = 40\pi$ rad/s

$\omega = \frac{40\pi}{2\pi} = 20$ rev/s

Ex2

A body rotates about a fixed axis with an angular acceleration of one radian/second^2. Through what angle does it rotate during the time in which its angular velocity increases from 5 rad/s to 15 rad/s.
[**Ans:** 100 rad]

$\alpha = 1$ rad/s^2
$\Delta\theta = ?$
$\omega_0 = 5$ rad/s
$\omega = 15$ rad/s

$\omega^2 = \omega_0^2 + 2\alpha \cdot \Delta\theta$

$15^2 = 5^2 + 2 \times 1 \times \Delta\theta$

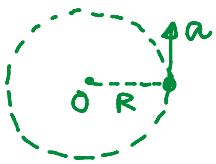
$225 = 25 + 2 \cdot \Delta\theta$

$200 = 2 \cdot \Delta\theta \Rightarrow \Delta\theta = \frac{200}{2} = 100$ rad

Ex3

A disc rotates about its axis with a constant angular acceleration of 4 rad/s^2. Find the radial and tangential accelerations of a particle at a distance of 1 cm from the axis at the end of the first second after the disc starts rotating.
[**Ans:** 16 cm/s^2, 4 cm/s^2]

$\alpha = 4$ rad/s^2
$R = 1$ cm.



$a_r = a_c = \omega^2 R$
$a_T = \alpha R$

Tangential acceleration $a_T = \alpha \cdot R = 4 \times 1$ cm/s^2

$a_T = 4$ cm/s^2

given at $t = 0$, $\omega_0 = 0$; $t = 1$ sec , $\omega = ?$

$t = 1 - 0 = 1$ sec

$\omega = \omega_0 + \alpha t \Rightarrow \omega = 0 + 4 \times 1$

$\omega = 4$ rad/s

$a_r = \omega^2 R = (4)^2 \cdot 1$ cm/s^2