(a) $N = N_0 e^{kt}$ $1923 = 18$

$1993 = 5000$

$N_0 = 18e^0$

$= 18$

$\frac{5000}{18}$ $5000 = 18e^{70k}$

$\frac{5000}{18} = e^{70k}$ $\therefore k = \frac{\left(\ln \frac{5000}{18}\right)}{70}$

$\cancel{= \ln\left(\frac{5000}{18}\right) = k70}$ $\therefore k = 0.080383163$

$\cancel{\therefore k = 5.626821434}$

~~when t = 80~~ , ~~N =~~

when $t = 88$ $N = 18e^{5.626821434 \times 88}$

$\cancel{= 18e^{495.1584}}$ $N = 18e^{0.0838 \times 88}$

$= 18e^{7.0131}$

$= 21249.53$

(approx)
$\therefore$ 21248 koalas will be on kangaroo in November 2001.

A, B, C, D, E

(b) (i) $P(A\ 1st) = \frac{1}{5}$ ~~4 sat places~~

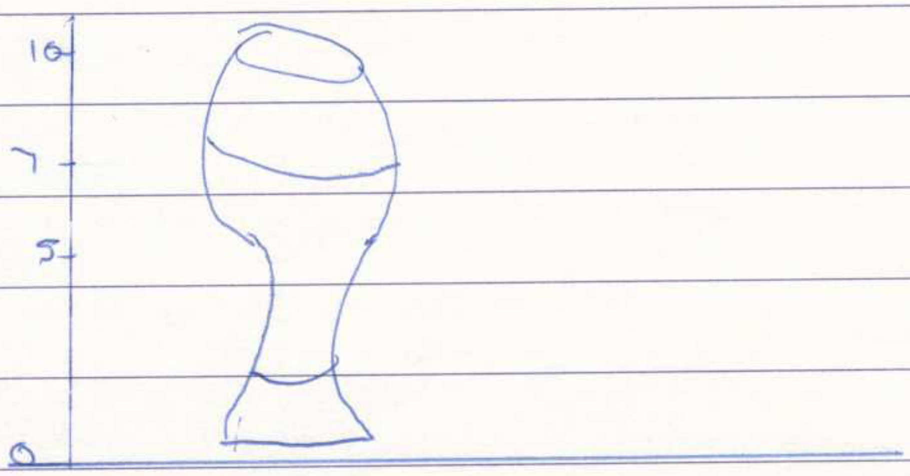
(ii)

$\frac{1}{5}$ A $\frac{1}{4}$ B $\frac{1}{3}$ C $\frac{1}{2}$ D 1 E

$P(ABCDE) = \frac{1}{5} \times \frac{1}{4} \times \frac{1}{3} \times \frac{1}{2} \times 1$

$= \frac{1}{120}$

(c)



(i) y_1 , $\frac{dy}{dx}$ is a max

∴ from graph $\frac{dy}{dx}$ is a max, when $y = 7$ cm

∴ $y_1 = 7$ cm

y_2 , $\frac{dy}{dx}$ is a minimum, when $x = 2$

∴ $y_2 = 2$cm

(ii)