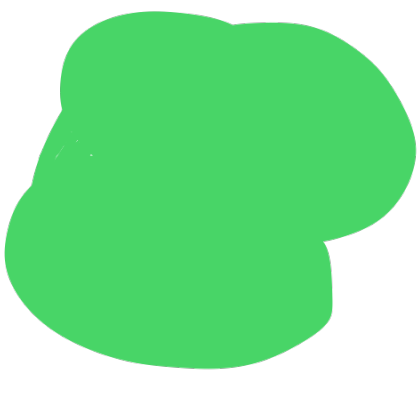
$r = E[7 - 0.5n]$ assuming the random term to be 0 (as it is almost negligible)

* we have to find total reward as a function of number of harvests. assuming discounting factor $\gamma = 1$

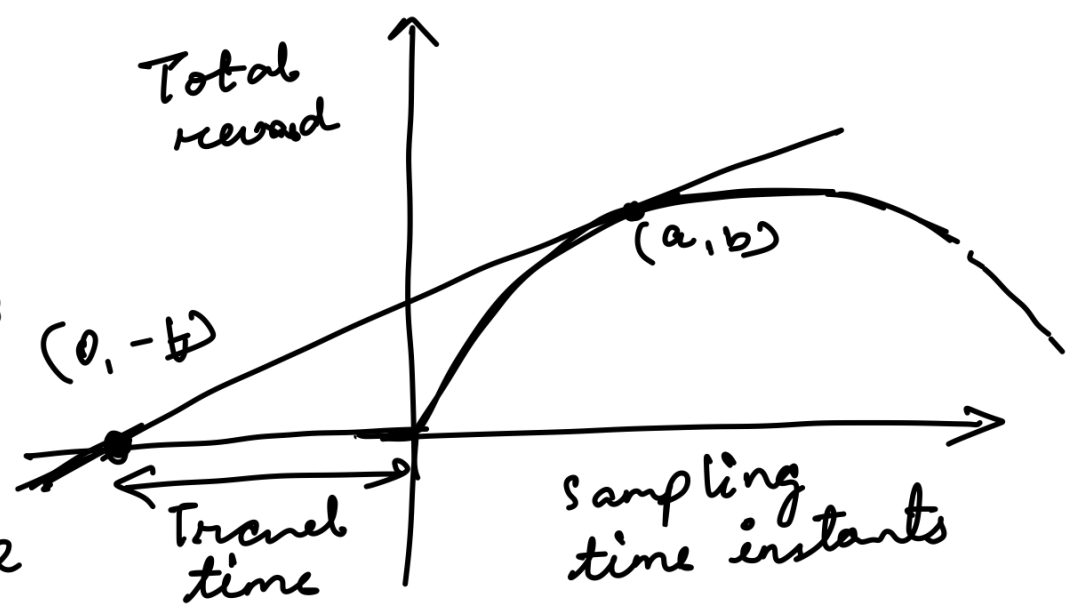
we know that the total reward we get at n^{th} instant is sum of rewards until n-1 instants starting from 0. let TR be total reward from a patch



	Reward	TR
$n = 1$	7	7 (we get reward at $n=1$ because we harvested at $n=0$)
$n = 2$	6.5	13.5
⋮	⋮	⋮
k	$7 - 0.5(k-1)$	$\sum_{n=1}^{k} 7 - 0.5(n-1)$

$$TR(n) = 7n - 0.5\frac{n(n-1)}{2} = \frac{29n - n^2}{4}$$

MVT → animals should leave current patch when energy intake rate within the patch diminishes to the average energy-harvesting rate in the environment.



eqⁿ of curve $\Rightarrow y = \frac{29x - x^2}{4}$

$\Rightarrow$ eqⁿ of tangent $\Rightarrow \frac{b}{a+b} = \left.\frac{dy}{dx}\right|_{(a,b)} = \frac{29-2a}{4}$

$b = \frac{29a - a^2}{4} \Rightarrow (29-2a)(a+t) = 29a - a^2$

$\Rightarrow a = t \pm \sqrt{29t + t^2}$

$= t + \sqrt{29t + t^2}$ as $(a<0)$ not possible.

$\Rightarrow a = t + \sqrt{29t + t^2}$ putting $t = 3$ we obtain

$a = 3 + \sqrt{32}$

$= 9.797$

$\Rightarrow$ a cant be a decimal. so let $a = 9/10$

lets assume for simplicity barrier time = 1 sec
and total time in environment = 100 sec.

Case - I

$\Rightarrow a = 9 \Rightarrow$ we have come path for 9 second

8 total path & a round of 4 times.

possible

Total round $= 8 \times 45 + 25 = 385$

Case II

$a = 10 \rightarrow$ Total path $= 7$ & 7 time round a right path

$\Rightarrow 7 \times \frac{19 \times 10}{4} + 45$

$= 332.5 + 45$

$= 377.5$

→ basically learning a patch at the lower bound time gives a better reward