

c) $K = \$2000/\text{year}$

$S(40) = 1,000,000$

$r = ?$

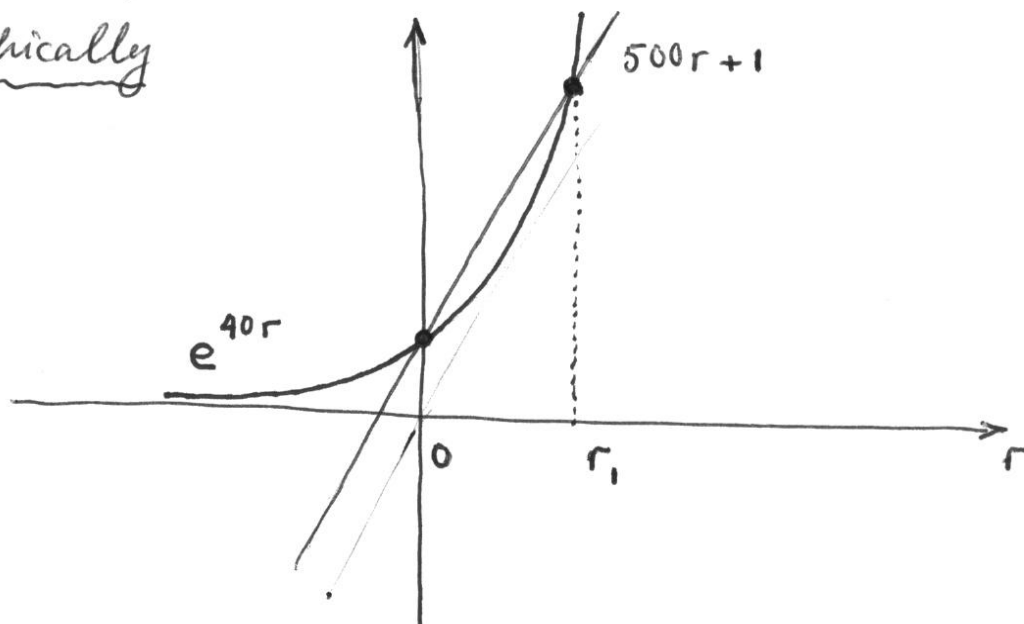
$$10^6 = \frac{2 \times 10^3}{r} (e^{40r} - 1)$$

$$500r = e^{40r} - 1$$

$$\Leftrightarrow e^{40r} - 500r - 1 = 0 \quad \dots *$$

Want to find r such that $\nearrow$ holds.

Graphically



$r_0 = 0$ is a solution to $*$ but it is not interesting.
We are interested in finding r_1 instead.

Set $y = e^{40r} - 500r - 1$

r	y (approx)
0.075	-18.41
0.095	-3.8
0.097	-1.076 < 0
0.098	0.4 > 0

By the Intermediate Value Theorem, there is a solution to $y = 0$ between 0.097 and 0.098. That solution has to be r_1 (see graph above)

$$r_1 \approx 9.77\%$$