§3.7 Modelling with rational functions

A population of rabbits can be modelled by $p(t) = \dfrac{3000t}{t+1}$ $\quad t \geq 0$.

what eventually happens to the rabbit population.

End behavior $\quad$ examples $\quad \dfrac{t^2+1}{2t^3-4} \qquad \dfrac{t^2+t+1}{t-4}$.

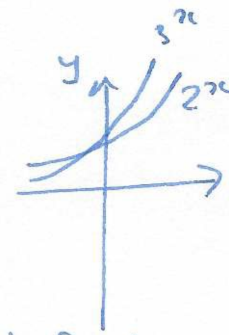
Drug concentration in the bloodstream may be ~~measured~~ modelled by $c(t) = \dfrac{30t}{t^2+2}$ mg/L.

What eventually happens to the drug concentration?

§4.2 Exponential functions

recall: 2^x

x	-3	-2	-1	0	1	2	3
2^x	$1/8$	$1/4$	$1/2$	1	2	4	8
3^x	$1/27$	$1/9$	$1/3$	1	3	9	27



special number $e = 2.71828\cdots$ $\quad e^x$. natural exponential function

Fact $\left(1+\frac{1}{n}\right)^n$ gets closer and closer to e as n gets large.

n	$(1+\frac{1}{n})^n$
1	2
10	2.488
100	2.704
1000	2.717...
$\vdots$	$\vdots$

think about compound interest.

1 dollar at 100% interest for one year : \$2.

1 dollar at $\frac{100}{12}$ interest for an yr each month \$?.

1 dollar at $\frac{100}{365}$ every day for a year ...

Compound interest $\quad$ P initial amount, r interest rate per year, t number of years.

$$A(t) = P\left(1+\frac{r}{n}\right)^{nt} \quad n \text{ compounding periods}$$

$$= P\left[\left(1+\frac{r}{n}\right)^{n/r}\right]^{rt}$$

$$= P\left((1+m)^m\right)^{rt}$$

as n gets large $\boxed{A(t) = Pe^{rt}}$