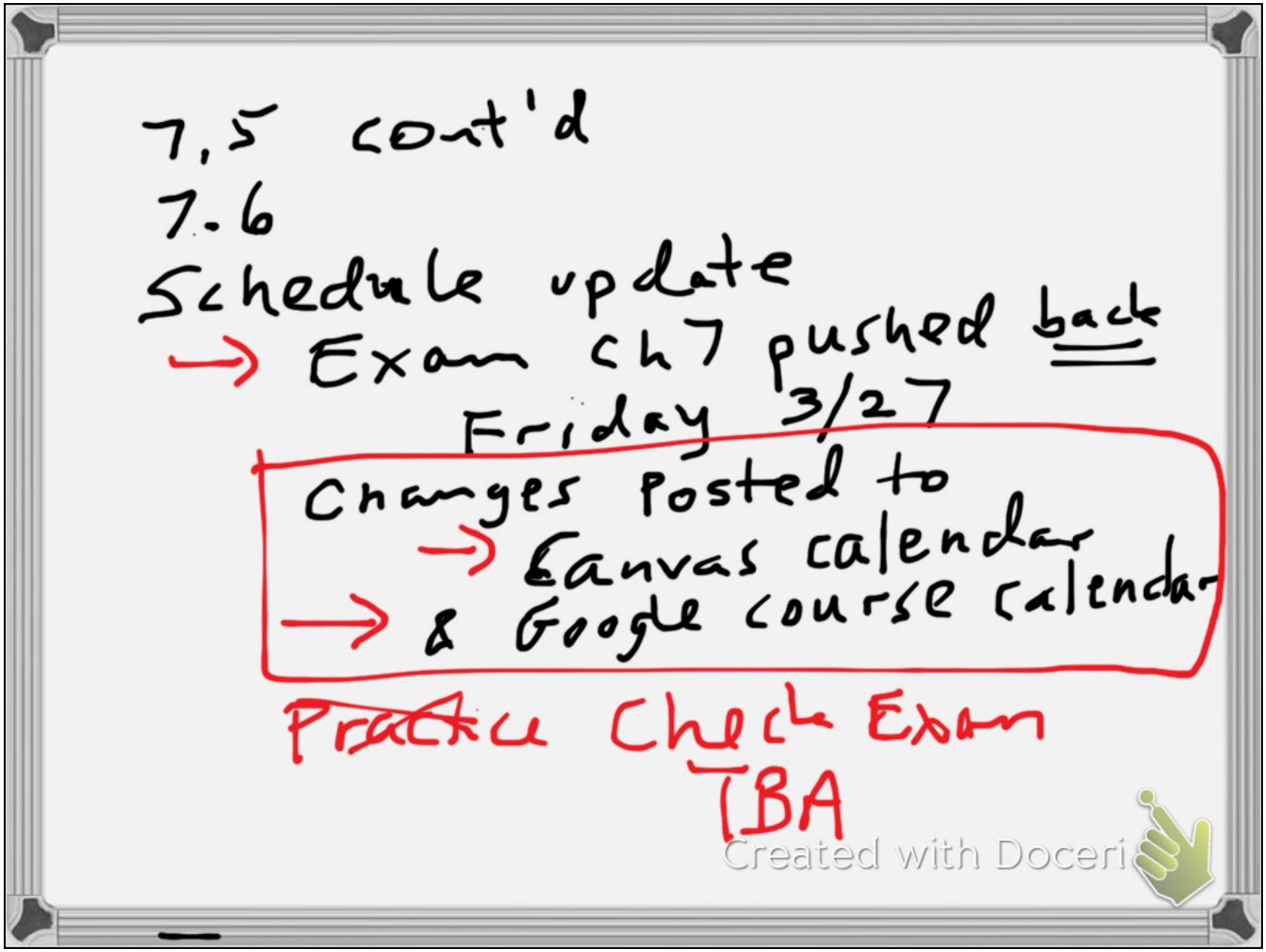
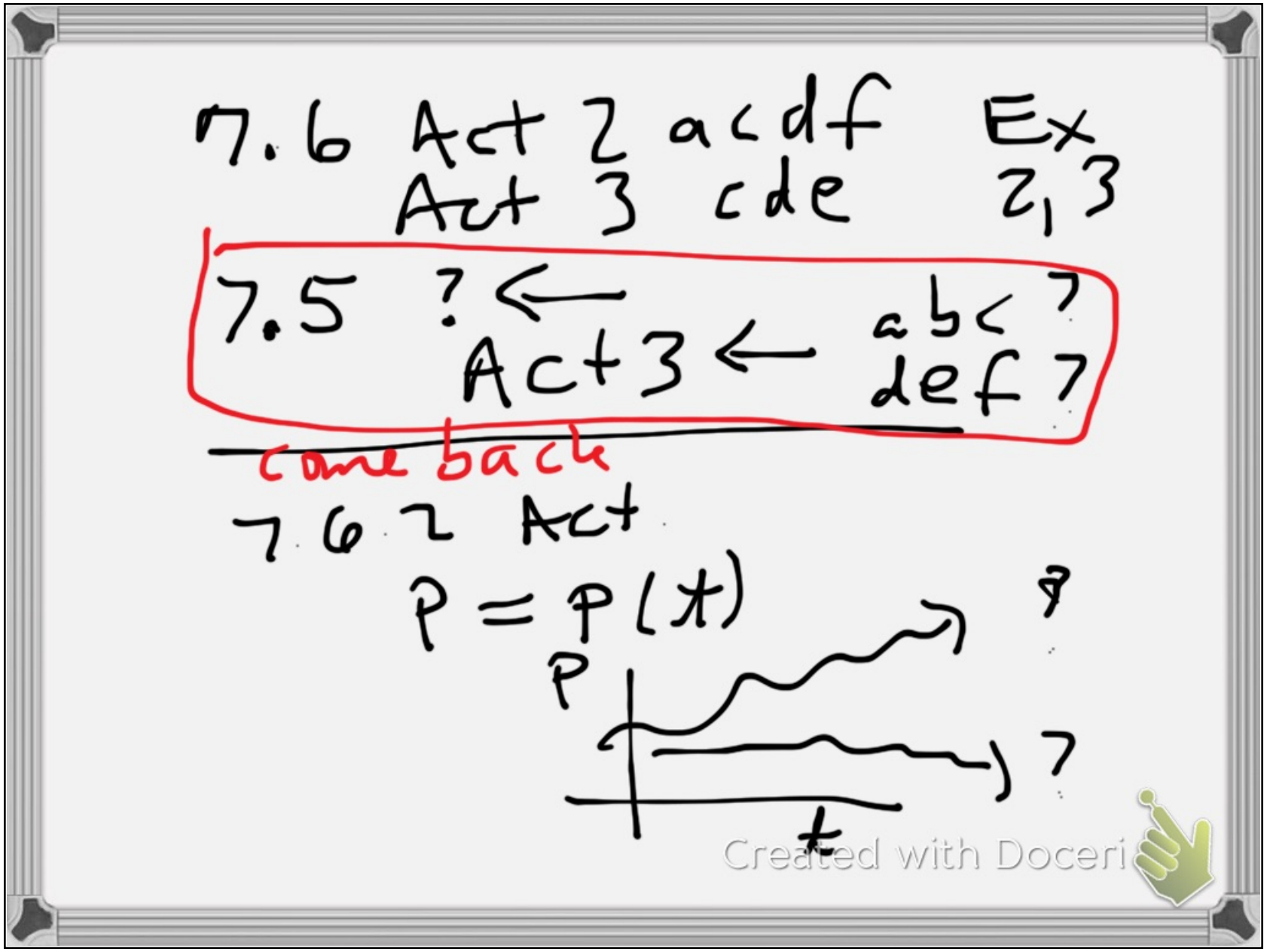
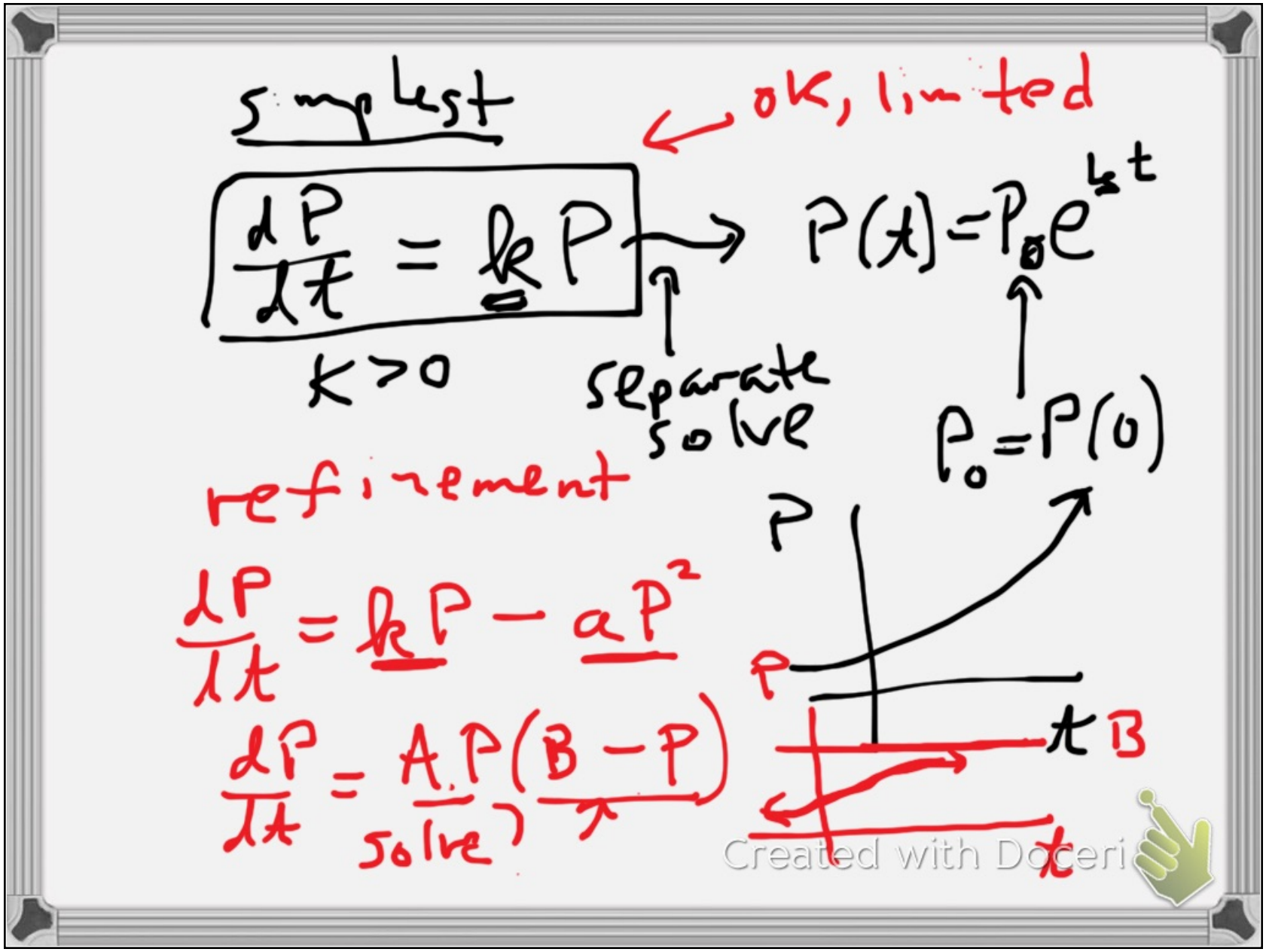
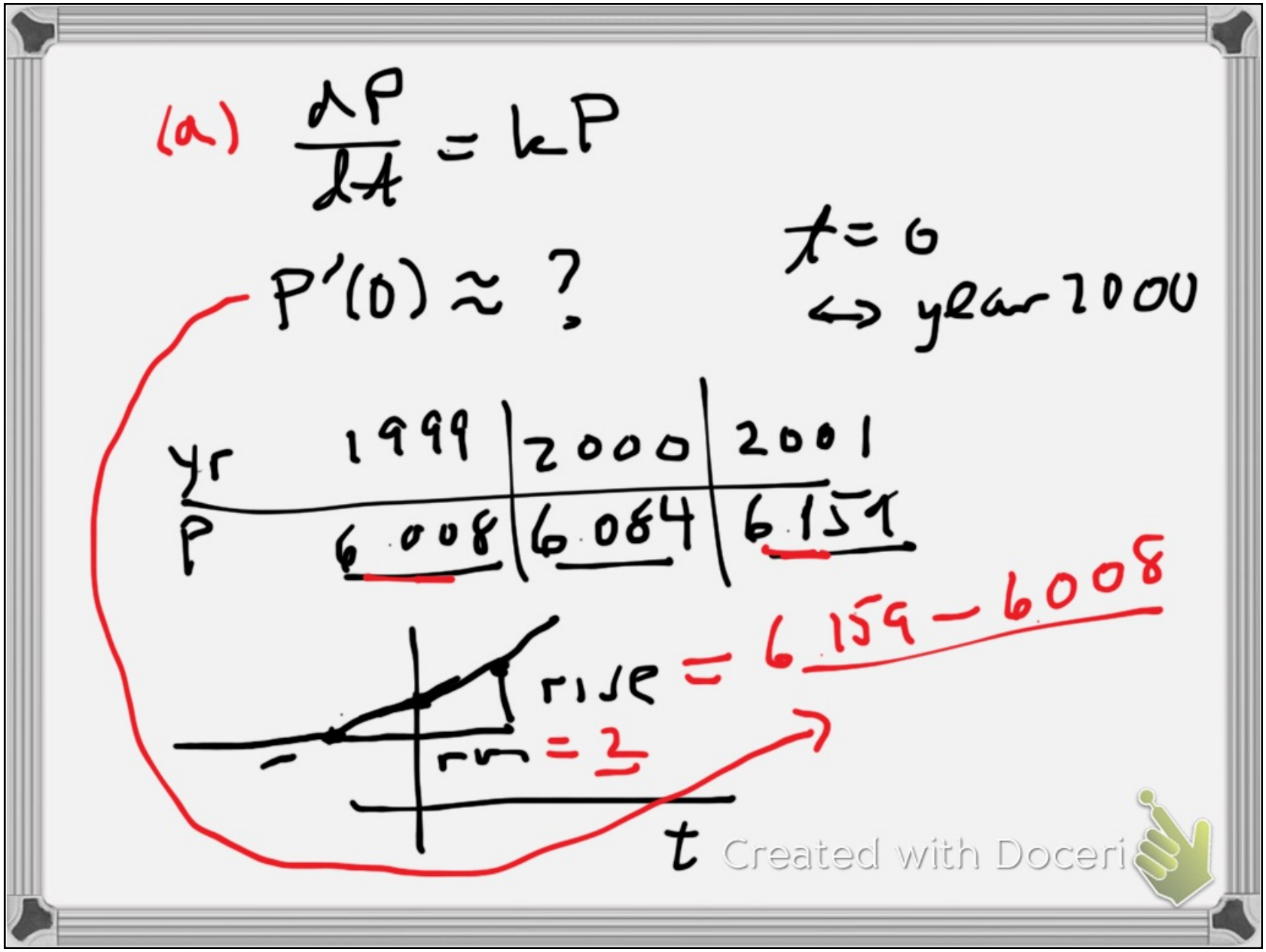
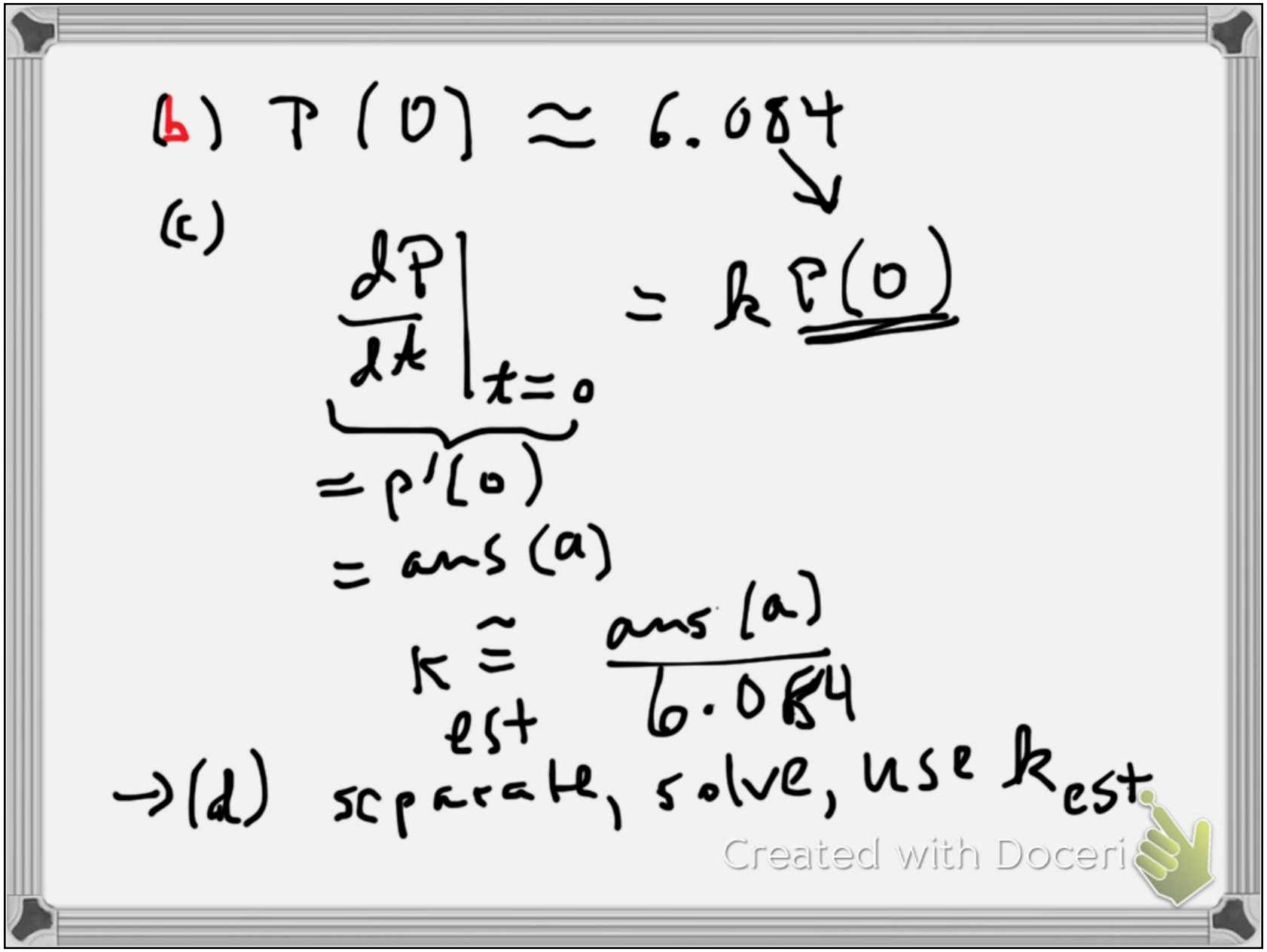

7.5 cont'd
7.6
Schedule update
→ Exam ch7 pushed back
Friday 3/27
Changes posted to
→ Canvas calendar
→ & Google course calendar
Practice Check Exam
TBA
Created with Doceri


7.6 Act 2 acdf Ex
Act 3 cde 2, 3
7.5 ? ←
Act 3 ← abc ?
def ?
come back
7.6 2 Act
P = P(t)
P
?
?
t
Created with Doceri


simplest
ok, limited
$\frac{dP}{dt} = kP$
$P(t) = P_0 e^{kt}$
$k > 0$
separate
solve
$P_0 = P(0)$
refinement
$\frac{dP}{dt} = kP - aP^2$
$\frac{dP}{dt} = AP(B - P)$
solve
P
t
B
Created with Doceri


(a) $\frac{dP}{dt} = kP$
$P'(0) \approx ?$
$t = 0$
$\leftrightarrow$ year 2000
yr | 1999 | 2000 | 2001
P | 6.008 | 6.084 | 6.151
rise = 6.159 − 6.008
run = 1
t
Created with Doceri


b) $P(0) \approx 6.084$
c) $\left.\frac{dP}{dt}\right|_{t=0} = kP(0)$
$= P'(0)$
$=$ ans (a)
$k \approx \frac{\text{ans (a)}}{6.084}$
est
→ (d) separate, solve, use k_{est}
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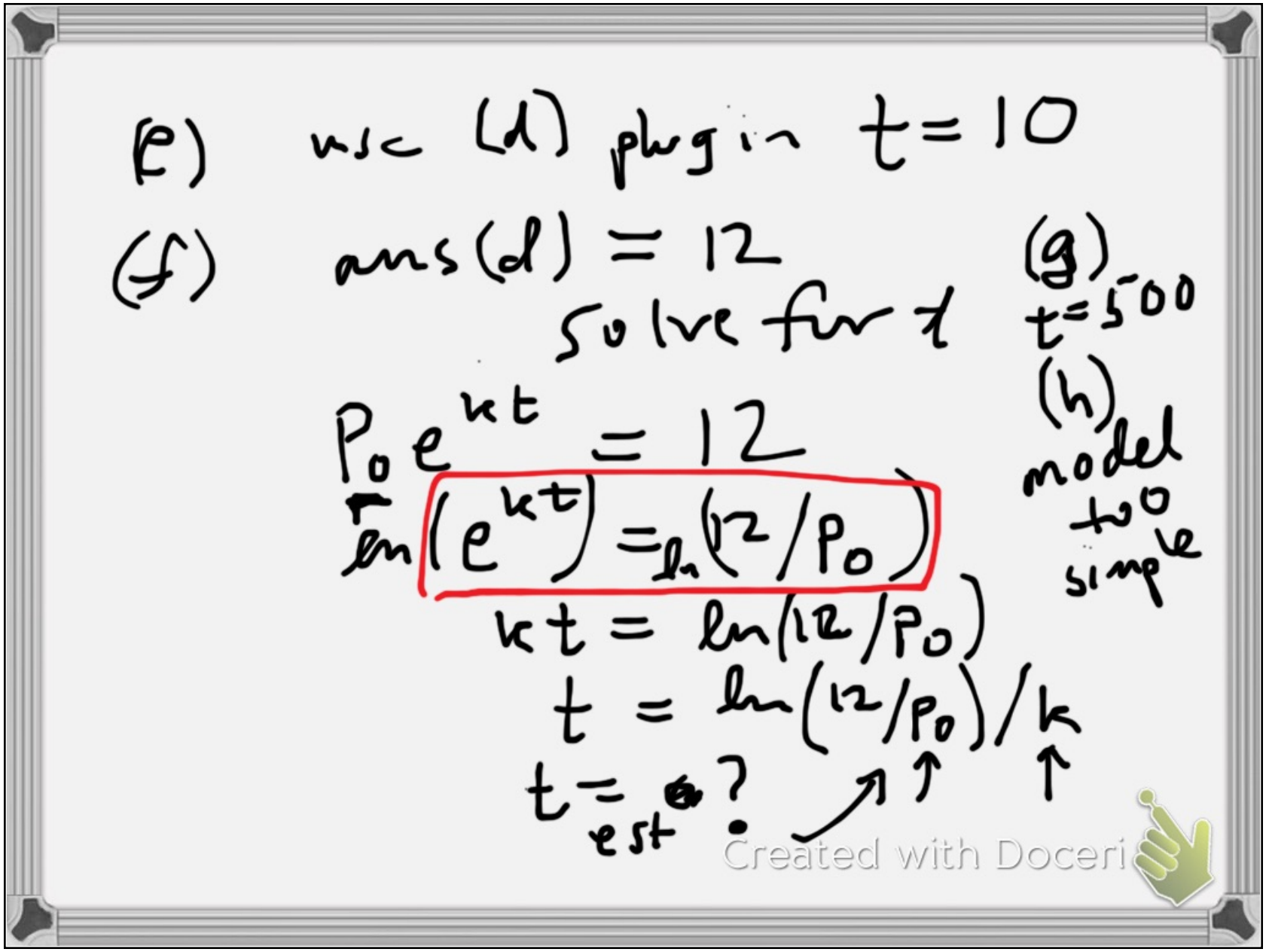
(e) use (d) plug in t=10
(f) ans(d) = 12
solve for t
$P_0 e^{kt} = 12$
$\ln(e^{kt}) = \ln(12/P_0)$
$kt = \ln(12/P_0)$
$t = \ln(12/P_0)/k$
t = est ?
(g) t=500
(h) model too simple
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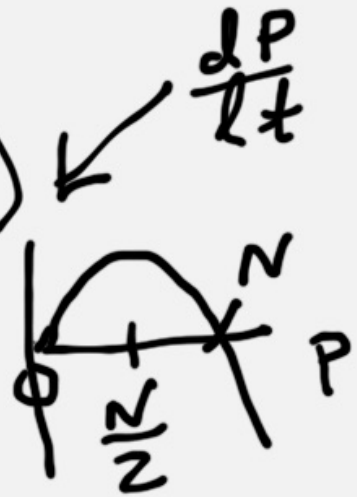
Act 7.6.3

$$\frac{dP}{dt} = kP(N-P)$$



(a) $\frac{dP}{dt}$ max ? when ?

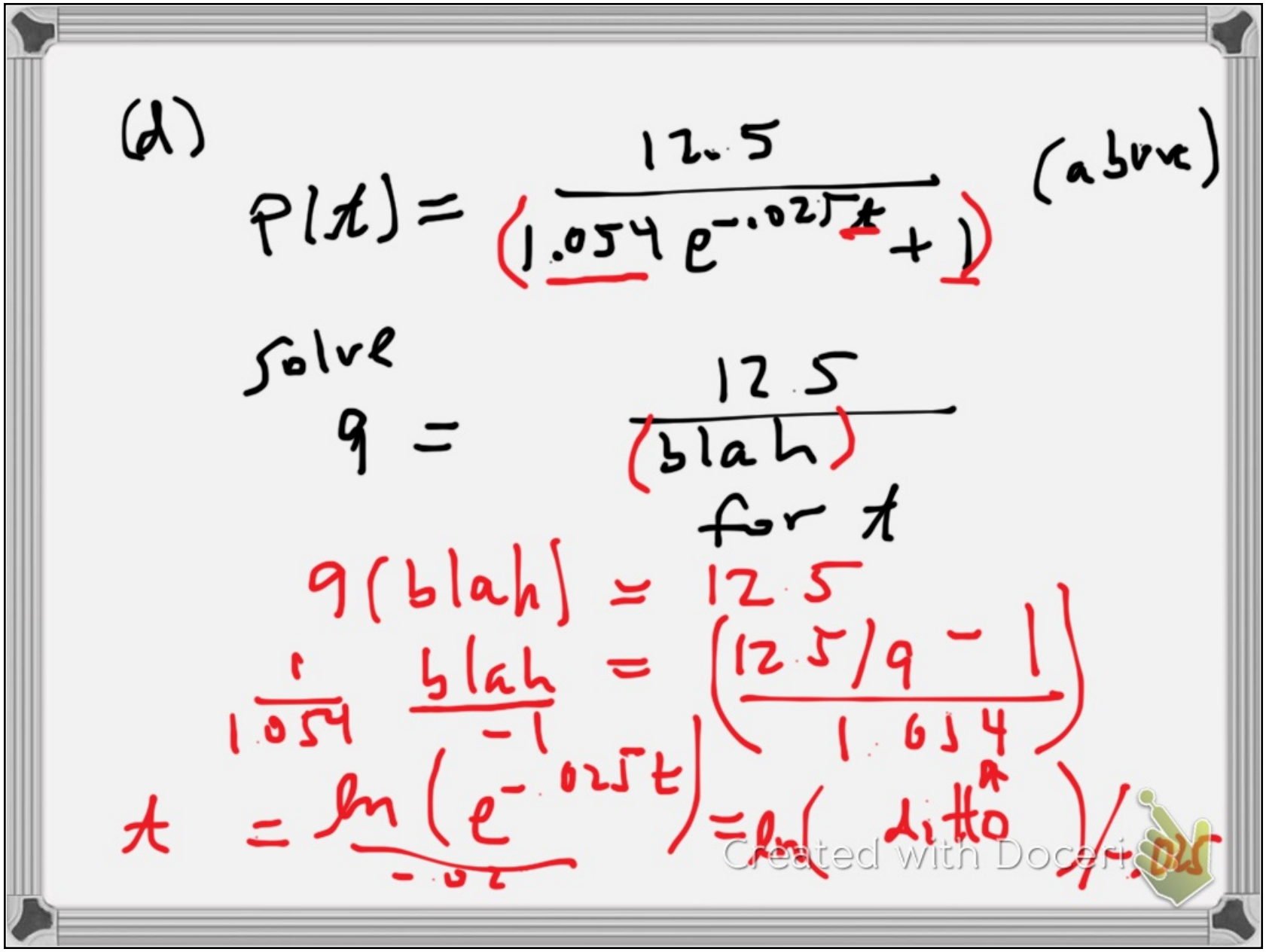
$P = ?$

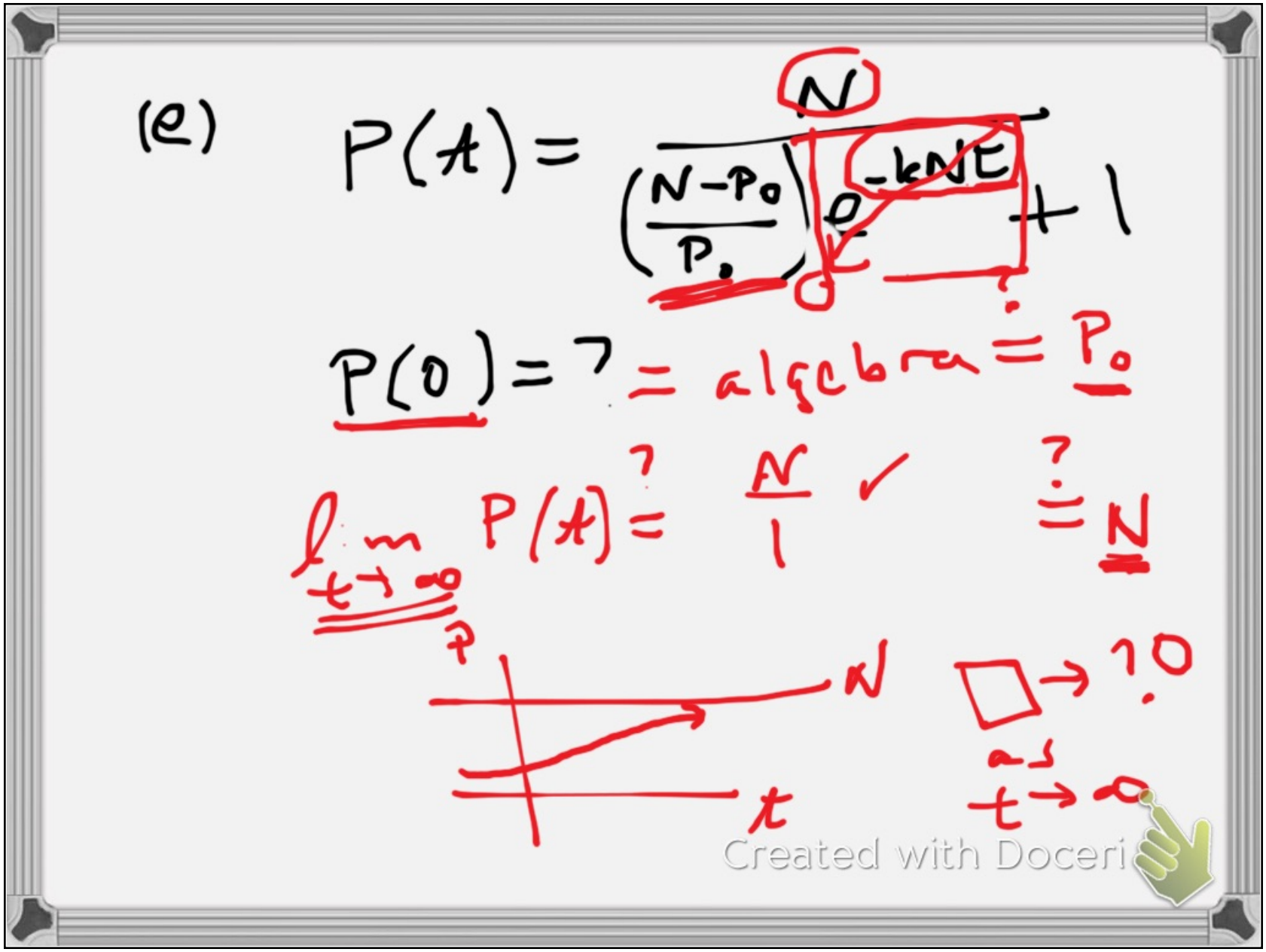
Ans $P = N/2$

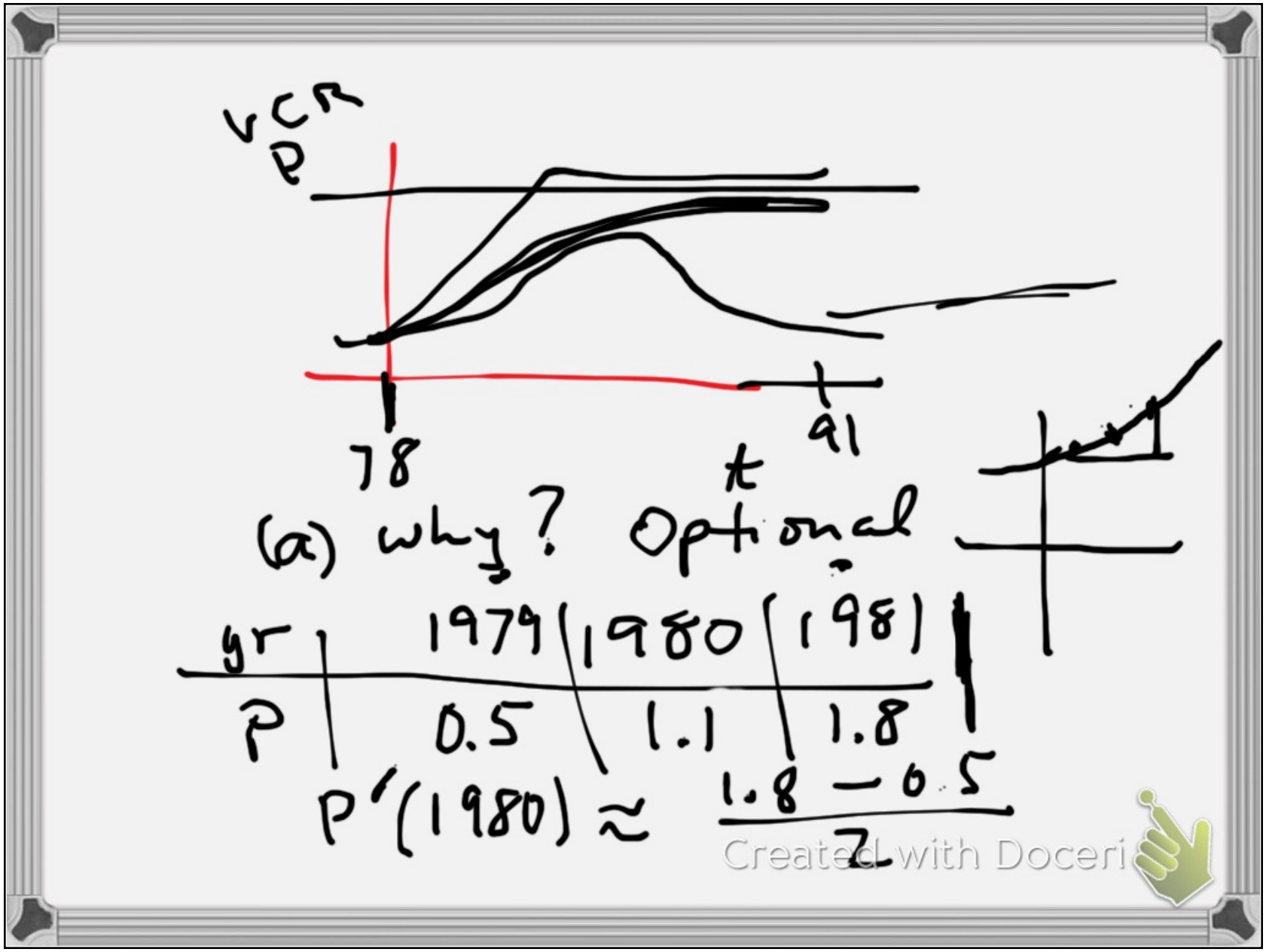
(b) $\frac{dP}{dt}$? refers to previous discussion

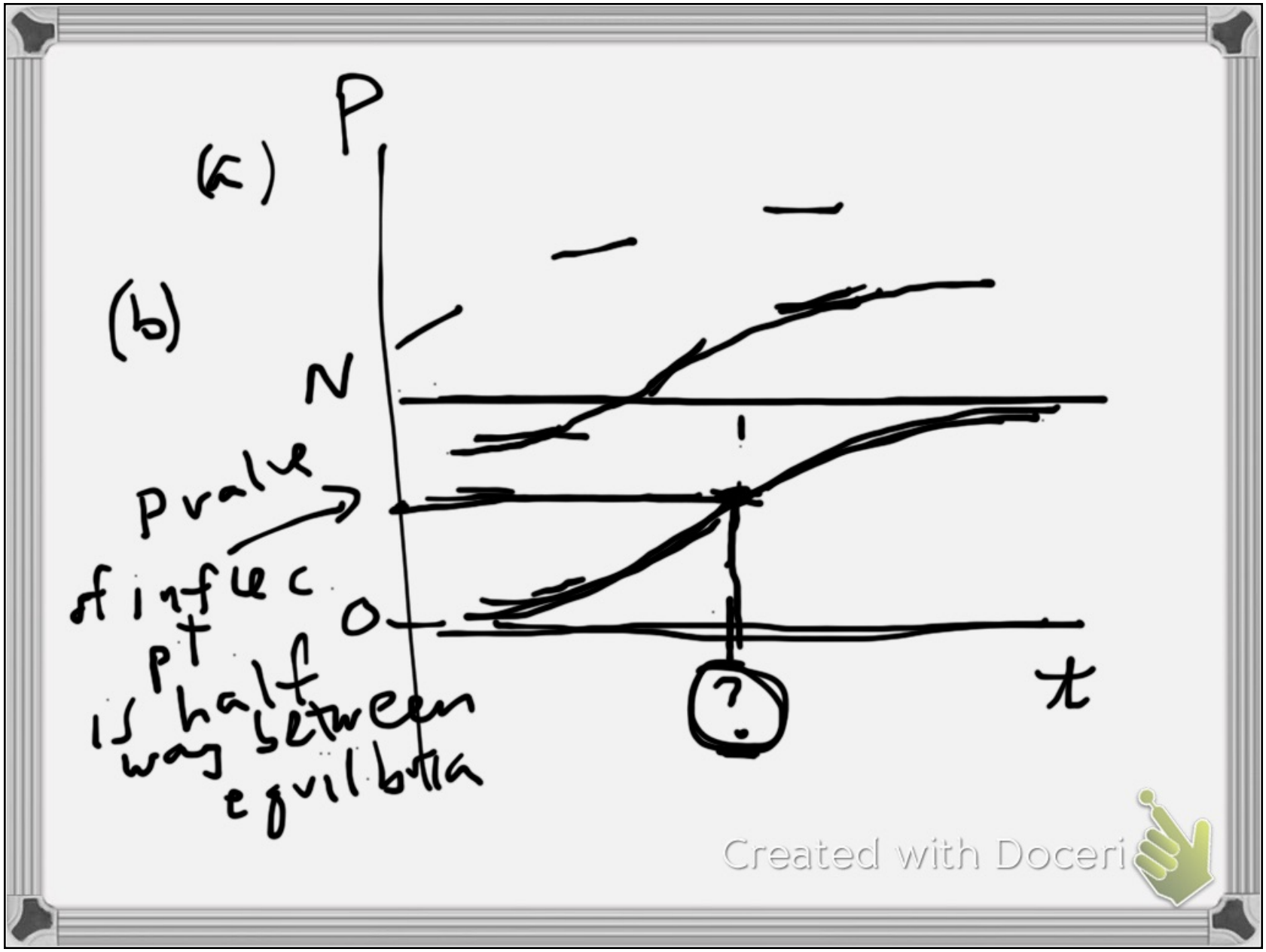
(c) Solution above (7.6.2)

$P(t) = \exp(t+C)/(\exp(t+C)+1)$


(d)
$P(t) = \frac{12.5}{(1.054\, e^{-.025t} + 1)}$ (above)
solve
$q = \frac{12.5}{(\text{blah})}$
for t
$q(\text{blah}) = 12.5$
$\frac{1}{1.054}\,\text{blah} = \left(\frac{12.5/q - 1}{1.654}\right)$
$t = \frac{\ln\left(e^{-.025t}\right)}{-.025} = \ln(\text{stuff})/(-.025)$
Created with Doceri


(e)
P(t) =
N
$\left(\frac{N-P_0}{P_0}\right)$
e
-kNt
+ 1
P(0) = ? = algebra = P_0
$\lim_{t \to \infty} P(t)$? = $\frac{N}{1}$ ✓ ? = N
P
N
t
□ → ?0
as
t → ∞
Created with Doceri


VCR
P
78
91
t
(a) why? Optimal
yr
1979
1980
(198)
P
0.5
1.1
1.8
P'(1980) ≈ 1.8 − 0.5 / 2
Created with Doceri


P
(a)
(b)
N
Pvalue
of inflec
pt
is half
way between
equilibria
O
?
t
Created with Doceri

(c)

$$P(t) = \frac{75}{1 + 316.75 e^{-.691t}}$$

$e^{-.691t} \to 0$ $\to 0$

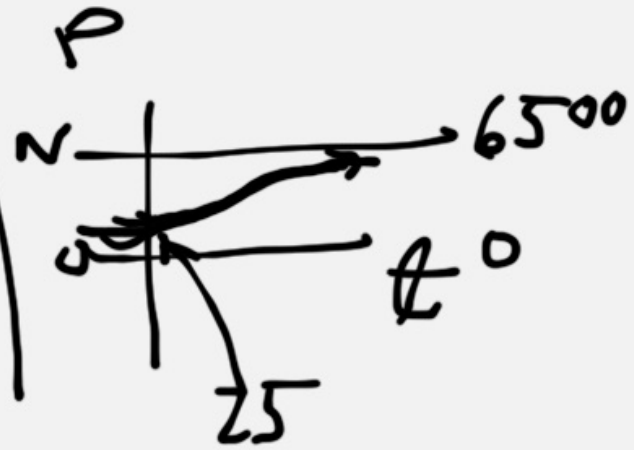
$$\lim_{t \to \infty} P(t) = 75$$

Ex3

$k = 1.7$

$P_0 = 25$

$N = 6500$



$$P(t) = \frac{N}{\left(\frac{N-P_0}{P_0}\right) e^{-krt} + 1}$$

Ex #12. Solving partial fractions

Monday → solve #5 for