QPOD: train #14 $p = 1.00$ lose $\frac{50}{.05}$
$q = 600$

$q - 600 = -\frac{50}{.05}(p-1)$
$= -1000(p-1)$
$q = 600 + 1000 - 1000p$
$= 1600 - 1000p$
$R = (1600 - 1000p)p$ MAX at $p = \frac{1-0}{2} = 80$ cents

Exp Growth Doubling Time (Exp. Growth)
When is $Q = Q_0 e^{kt} = 2Q_0 e^{kt}$
Solve for T ... $e^{kt} = 2$ ... $t = \frac{\ln(2)}{k}$
Given doubling Time, T_0 what is Q

$$Q(t) = Q_0 (2)^{t/T_0}$$

Example C Interest doubles every 25 years; how much is 10 pesos
What is rate? $Q(t) = Q_0 (2)^{t/25}$

Counting Sample test true: #21. $f(x) = e^{kx}$ (Growth) $f(1) = 100$ ← COUNT 1

Exp Decay Half Life $Q(t) = Q_0 e^{-kt} = Q_0 \left(\frac{1}{2}\right)^{t/T}$ (V.B.) $(e^{-kT} = \frac{1}{2})$

T is the time when $\frac{1}{2}$ is present

Carbon Dating Ratio $\frac{^{14}C}{^{12}C} = \frac{1}{7}$ initial
$=$ Original $\left(\frac{1}{2}\right)^{t/5730}$

Problem 26.

$$\left(\frac{1}{2}\right)^{t/5730} = \left(\frac{1}{7}\right)$$

$$\frac{t}{5730}\ln\left(\frac{1}{2}\right) = \ln\left(\frac{1}{7}\right); \quad t = \underbrace{5730}_{\text{Half-life}} \frac{\ln\left(\frac{1}{7}\right)}{\ln\left(\frac{1}{2}\right)}$$

≈ 16036 (CALCULATOR)

Last example

$C(x) = \frac{1}{8}x^2 + 4x + 200$

Minimize Average Cost.

$\frac{d}{dx}\frac{C(x)}{x} = \frac{x(\frac{1}{4}x+4) - (\frac{1}{8}x^2+4x+200)}{x^2} = 0$

Solve $x(\frac{1}{4}x+4) - (\frac{1}{8}x^2+4x+200)$

$\frac{1}{4}x^2 + 4x - \frac{1}{8}x^2 - 4x - 200$

$\frac{1}{8}x^2 = 200$

$\therefore x = 40$ (by hand)

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23. $F(t) =$ Failure (Survival Rate)

$F(t) = e^{-kt}$ exponential decrease

"twice as many human aft 3 wks as are burning"

at 9 weeks: Survival after 18.

"half-life" (not doubling time)

$F(t) = \left(\frac{1}{2}\right)^{t/6}$ at $t = 18$

$\left(\frac{1}{2}\right)^{18/6} = \frac{1}{8}$.

21. Counting $f(3) =$ $f(t) = e^{kx}$ $f(1) = 100$

Solving equations

Eqn. has ln — take $e^{\quad} = e^{\quad}$

equation has exponent #25 $2\ln(x) - \frac{1}{3}\ln(x^2) = 4$

e e

rules $\frac{4}{3}\ln(x) = 4$

$\ln(x) = 3$

e

Expon

Table rules and ln.

27. $5^x = e^8$ $\ln(5^x) = 8$; $x = \frac{8}{\ln 5} \approx$

(27.) CC 3000 mag $T = 14$ (Doubling time)

$F(t) = \left(\frac{1}{2}\right)^{t/14} = e^{rt}$ $\left(\frac{1}{2}\right)^{1/14} =$

test pursample corr #27

Simple $6000 = 3000 e^{r14}$

Solve for r

$2 = e^{r14}$

$\ln(2) = r14$, $r = \frac{\ln(2)}{14} \approx 5$

Obj ③ critical number, rel max/min,

$y = \frac{8}{x^2 - 8x + 7}$ NB $x^2 - 8x + 7 = (x-7)(x-1)$

$\frac{dy}{dx} = \frac{-8(2x-8)}{(\quad)^2}$ crit no at $x = 4$

changes + to − so ↗ ↘ relative max.
