LESSON 35

MA 16100 · FALL 2022

DR. HOOD

WARM UP

Use Substitution Rule to evaluate:

$$\int 12e^{3t}dt$$

$u = 3t$

$du = 3dt$

$\frac{du}{3} = dt$

$\int 4e^{u}\,du = 4e^{u} + C$

$= \boxed{4e^{3t} + C}$

a) $4e^{3t} + C$

b) $12e^{3t} + C$

c) $36e^{3t} + C$

ANNOUNCEMENTS

- Dr. Hood's Office Hours in Math 844
  - Mon, Wed: 3:30-4:30pm
  - Fri: 2:30-3:30pm

- TA's Office Hours in Math Resource Room (WTHR 313)
  - Mon – Thu: 9:30am – 8:30pm
  - Fri: 9:30am – 3:30pm

ANNOUNCEMENTS

- **Exam 3 Scores** – most are posted
  - Regrade Request: https://purdue.ca1.qualtrics.com/jfe/form/SV_0cU4iadAh8Txeqa
    - Must be submitted by 5pm Friday Dec 9

- **Final Exam**
  - Tuesday Dec 13 at 8:00 am - 10:00 am

POLL 1

If $\frac{dy}{dt} = 0.03y$, then which of the following functions could be $y(t)$?

a) $y(t) = A\cos(0.03t)$

b) $y(t) = 0.03t + C$

c) $y(t) = Ae^{0.03t}$

$\frac{dy}{dt} = \frac{d}{dt}\left(Ae^{0.03t}\right)$

$= A\left(e^{0.03t} \cdot 0.03\right)$

$= (0.03)\left(Ae^{0.03t}\right)$

$\frac{dy}{dt} = (0.03)\,y$

POLL 2

If Alice initially starts with $y_0 = 500$ dollars in her savings account, how long will it take her to save up for her new phone at $1000?

a) 23 years

b) 0.7 years

c) 48 years

doubling time

$$y(t) = 500e^{0.03t} = 1000$$

$$\ln(e^{0.03t} = 2)$$

$$0.03t = \ln(2)$$

$$\boxed{t = \frac{\ln(2)}{0.03} \approx 23 \text{ years}}$$

POLL 3

$10000 e^{-0.05t} = 5000$

$\ln(e^{-0.05t} = \frac{1}{2})$

If the population is $y(t) = 10000e^{-0.05t}$, then how long will it take for the population to halve? (i.e. $y(t) = 5000$?)

$-0.05t = \ln(\frac{1}{2})$

half-life $\longrightarrow$ $\boxed{t = \frac{\ln(\frac{1}{2})}{-0.05}}$

a) $t = \frac{-0.05}{\ln\left(\frac{1}{2}\right)}$

b) $t = \frac{\ln\left(\frac{1}{2}\right)}{-0.05}$

c) $t = 0.05\ln\left(\frac{1}{2}\right)$

≈ 13.8 years