

Watch. Practice. Understand. | Lesson 274

Calculus James Steward 3.8 Lecture Notes

Watch the matching video: https://www.youtube.com/watch?v=x35Hx-_Gc80

Practice focus: Exponential change and cooling

Related course review; confirm topics with your teacher.

Name: _____ Date: _____ Show your reasoning and check units.

01 A quantity satisfies $y' = 0.2y$ and $y(0) = 50$. Find $y(t)$.

02 A population doubles in 4 h under continuous exponential growth. Find its growth constant.

03 An object cools in a 20°C room: $T(t) = 20 + 60e^{(-0.1t)}$, with t in minutes. Find initial temperature and limiting temperature.

04 For that cooling model, when does T reach 50°C ?

Worked answers | Lesson 274

Calculus James Steward 3.8 Lecture Notes

Watch the matching video: https://www.youtube.com/watch?v=x35Hx-_Gc80

Practice focus: Exponential change and cooling

Related course review; confirm topics with your teacher.

01 A quantity satisfies $y' = 0.2y$ and $y(0) = 50$. Find $y(t)$.

Exponential solution $y(t) = 50e^{(0.2t)}$.

02 A population doubles in 4 h under continuous exponential growth. Find its growth constant.

$2 = e^{(4k)}$, so $k = (\ln 2)/4$ per hour.

03 An object cools in a 20°C room: $T(t) = 20 + 60e^{(-0.1t)}$, with t in minutes. Find initial temperature and limiting temperature.

$T(0) = 80^\circ\text{C}$; as $t \rightarrow \infty$, exponential term tends to 0, so $T \rightarrow 20^\circ\text{C}$.

04 For that cooling model, when does T reach 50°C ?

$30 = 60e^{(-0.1t)}$, so $e^{(-0.1t)} = 1/2$ and $t = 10\ln 2 \approx 6.93$ minutes.