Assignment 2

CSCI 2897 - Calculating Biological Quantities - Larremore - Fall 2022

Notes: Remember to (1) familiarize yourself with the collaboration policies posted on the Syllabus, and (2) turn in your homework to Canvas as a **single PDF**. Hand-writing some or most of your solutions is fine, but be sure to scan and PDF everything into a single document. Unsure how? Ask on Slack!

Bicep curls

Calculate these derivatives.

1. $\dfrac{d}{dx}\cos(2x) =$

2. $\dfrac{d}{dx}\cos(x^2) =$

3. $\dfrac{d}{dx}xe^x =$

4. $\dfrac{d}{dx}\ln(x^2) =$

EC A. $\dfrac{d}{dx}\left[\sin(x)\cos(x)\right] =$

Tricep extensions

Calculate these indefinite integrals. Don't forget your constant!

5. $\int x^2 \, dx =$

6. $\int x^{-2} \, dx =$

7. $\int e^{2\pi x} \, dx =$

8. $\int \sin x \, dx =$

EC B. $\int \sin x \, \csc x \, dx =$

Planks

For each family of solutions below, (i) use the *initial condition* to solve for the unknown constant α, and then (ii) write the solution with the solved-for constant plugged in and simplified.

9. $y(t) = \alpha e^{3t}, \quad y(0) = 10$

10. $y(t) = \alpha e^{t/2}, \quad y(6) = e$

11. $n(t) = \dfrac{K}{1 + \alpha K e^{-rt}}, \quad n(0) = 1$

12. $y(x) = \dfrac{1}{x^2 + \alpha}, \quad y(2) = \dfrac{1}{3}$

EC C. $n(t) = \dfrac{K}{1 + \alpha K e^{-rt}}, \quad n(0) = K$

Separation of Variables

Classify each equation as separable or not separable. Then, for separable equations, separate the variables *but do not integrate.*

13. $t\dfrac{dy}{dt} = 4y$

14. $t\dfrac{dy}{dt} = 4 + t$

15. $y \ln t \dfrac{dy}{dt} = \left(\dfrac{y+1}{t}\right)^2$

16. $e^t + e^y = \dfrac{dy}{dt}$

EC D. $e^{t+y} = \dot{y}$