Practice Questions

1. What is the derivative of $\dfrac{x^{10}}{10!}$?

2. How to see that $\dfrac{x^n}{n!}$ gets small as $n \to \infty$?

Start with $\dfrac{x}{1}$ and $\dfrac{x^2}{2}$, possibly big. But we multiply by $\dfrac{x}{3}, \dfrac{x}{4}, \cdots$ which gets small.

3. Why is $\dfrac{1}{e^x}$ the same as e^{-x}?

4. Why is $e^{-1} = 1 - 1 + \dfrac{1}{2} - \dfrac{1}{6} + \cdots$ between $\dfrac{1}{3}$ and $\dfrac{1}{2}$? Then $2 < e < 3$.

---

5. Can you solve $\dfrac{dy}{dx} = y$ starting from $y = 3$ at $x = 0$?

Why is $y = 3e^x$ the right answer?

6. Can you solve $\dfrac{dy}{dx} = 5y$ starting from $y = 1$ at $x = 0$?

Why is $y = e^{5x}$ the right answer?

7. Why does $\dfrac{e^{\Delta x} - 1}{\Delta x}$ approach 1 as Δx gets smaller?

MIT OpenCourseWare
http://ocw.mit.edu

Resource: Highlights of Calculus
Gilbert Strang

The following may not correspond to a particular course on MIT OpenCourseWare, but has been provided by the author as an individual learning resource.

For information about citing these materials or our Terms of Use, visit: http://ocw.mit.edu/terms.