

Practice Questions

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

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

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

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

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

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

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

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

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

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

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Resource: Highlights of Calculus
Gilbert Strang

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