

MATH 130A Review: Euler Number and Limits

Facts to Know

- Euler's number
- Taylor series expansion of a function $f(x)$ centered at zero
- Miscellaneous facts
 - $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$
 - $\lim_{n \rightarrow \infty} \left(1 + \frac{\lambda}{n}\right)^n$
 - $\sum_{n=0}^{\infty} \frac{1}{n!}$
 - $\sum_{n=0}^{\infty} \frac{\lambda^n}{n!}$

Examples

- Fill in the table with a calculator the value of $(1 + \frac{\lambda}{n})^n$

	$n = 100$	$n = 1000$	$n = 10,000$
$\lambda = 0.05$			
$\lambda = 0.10$			
$\lambda = 0.15$			
$\lambda = 1$			

- Determine the exact limit value of the expression (Hint: write the expression using Σ -notation)

$$1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \frac{1}{6!} + \dots$$

- Determine the exact limit value of the expression

$$\lim_{n \rightarrow \infty} \left(1 - \frac{\pi}{n}\right)^n$$