# Section 4.2 Notes

The Natural Exponential Function

## 1 Introduction

**Definition**

- The *natural exponential function* is given by

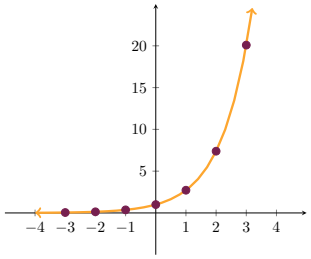
$$f(x) = e^x$$

- $e$ is an irrational number

$$e \approx 2.7182818$$

**The Graph of the Natural Exponential Function**
Let's graph $y = e^x$

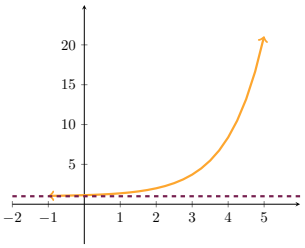
| $x$ | $y$ |
|---|---|
| $-3$ | $e^{-3} \approx 0.0498$ |
| $-2$ | $e^{-2} \approx 0.1353$ |
| $-1$ | $e^{-1} \approx 0.3679$ |
| $0$ | $e^0 = 1$ |
| $1$ | $e^1 \approx 2.7183$ |
| $2$ | $e^2 \approx 7.3891$ |
| $3$ | $e^3 \approx 20.0855$ |




## 2 Graphing Using Transformations

**Example**

Graph $y = e^{x-2} + 1$ using transformations.




## 3 Continuously Compounded Interest

**Continuously Compounded Interest Formula**

$$A(t) = Pe^{rt}$$

- $t$ is the time in years

- $A(t)$ is the amount of money after $t$ years
- $P$ is the principal (initial) amount of money
- $r$ is the nominal yearly interest rate.

**Example**

Find the amount after 4 years if \$100 is invested in an account with a 5% interest rate, compounded continuously.

\$122.14