Precalculus

Me. I am Him.

11/28/2022

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3.1 Properties of functions and Complex Zeros

3.1.1 3.1 - Completing the square

Definition 3.1.1: Completing the square

In form $ax^2 + bx + c$, you half b, and then square.

Note:-

Forms:

$$\text{Standard: } ax^2 + bx + c \; ; \; a \neq 0$$
$$\text{Vertex: } a(x - h)^2 + k \; ; \; a \neq 0$$

Note:-

Verticies:

$$\text{Standard: (-b/2a , f(-b/2a))}$$
$$\text{Vertex: (h , k)}$$

Note:-

Axis of Symmetry:

$$\text{Standard: x=-b/2a}$$
$$\text{Vertex: x=h}$$

Note:-

y-Intercept

$$\text{Standard: (0 , c)}$$
$$\text{Vertex: } \textit{Plug in 0 for x and solve}$$
$$\text{Note; There is always one.}$$

Note:-

x-Intercept

Standard: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, otherwise known as the quadratic formula.

If the inside of the quadratic is < 0, there are no x-intercepts.

If the inside of the quadratic is $= 0$, there is exactly one x-intercept.

If the inside of the quadratic is > 0, there are exactly two x-intercepts.

Vertex: *Plug in 0 for y and solve*

Chapter 4

4.1 4: Composite Functions

4.1.1

> **Note:-**
> 11/28/2022 - Didn't really do much. just reviewed moslt what fog or f(g(x)) was.

4.1.2

4.1.3 Exponential Functions

> **Definition 4.1.1: Are you prepared? MAKE NEW COMMAND**
>
> - $4^3 = 8$
> - $8^{\frac{2}{3}} = 4$
> - $3^{-2} = \frac{1}{9}$

> **Note:-**
> In a^n, a is known as the base whereas n is known as the exponent, index, or power.
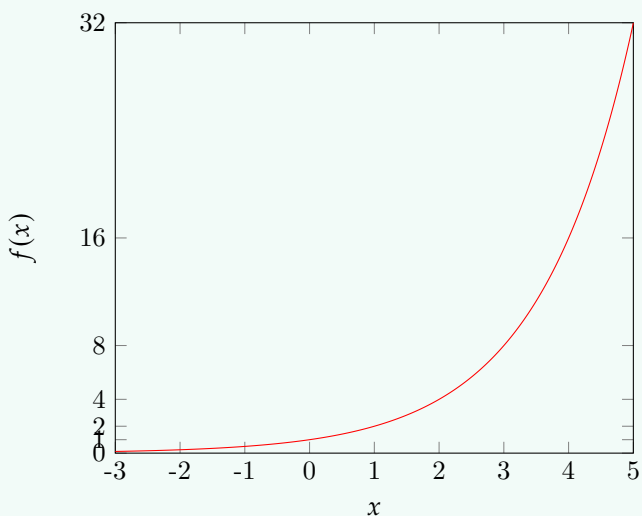
> **Note:-**
> Law of Exponents:
>
> (1) $a^m \cdot a^n = a^{m+n}$ Example: $3^2 \cdot 3^5 = 3^{2+5} = 3^7 = 2187$
>
> (2) $(a^m)^n = a^{mn}$ Example: $(2^3)^2 = 2^{3 \cdot 2} = 2^6 = 64$
>
> (3) $(ab)^m = a^m b^m$ Example: $(5x)^3$
>
> (4) $1^n = 1$ Exaple: $11001 = 1$
>
> (5) $a^{-n} = \frac{1}{a^n}$ Example: $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$
>
> (6) $a^0 = 1$ Example: $7^0 = 1$
>
> (7) $a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$ Example: $8^{\frac{2}{3}} = \sqrt[3]{8^2} = (\sqrt[3]{8})^2 = 2^2 = 4$

> **Definition 4.1.2: Exponential Function**
>
> A function of the form f(x) = a^x where x is a positive real number (a>0) and a $\neq$ 1. The domain of f is $\mathbb{R}$

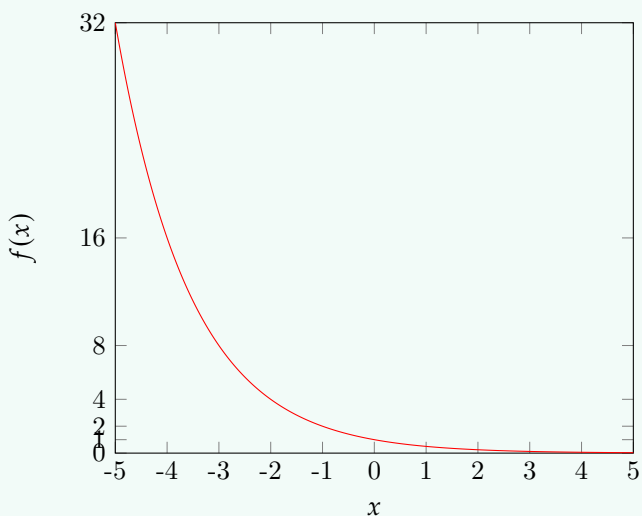> **Example 4.1.1** (2: Graph the exponential function: $f(x) = 2^x$)

Example 4.1.2 (3: Graph the exponential function: $f(x) = (\frac{1}{2})^2$)

2. There are no x-intercepts; the y-intercept is 1.

3. The x-axis (y = 0) is a horizontal asymptote as $x \to \infty$.

4. The function is an decreasing function and is one-to-one.

5. The graph of f contains the points (0, 1), (1, a), and (-1, 1/a).

6. The graph of f is smooth and continuous, with no corners or gaps.

Example 4.1.3 (Graph $f(x) = 2^{-x} - 3$ and determine the domain, range, and horizontal asymptote of f.)
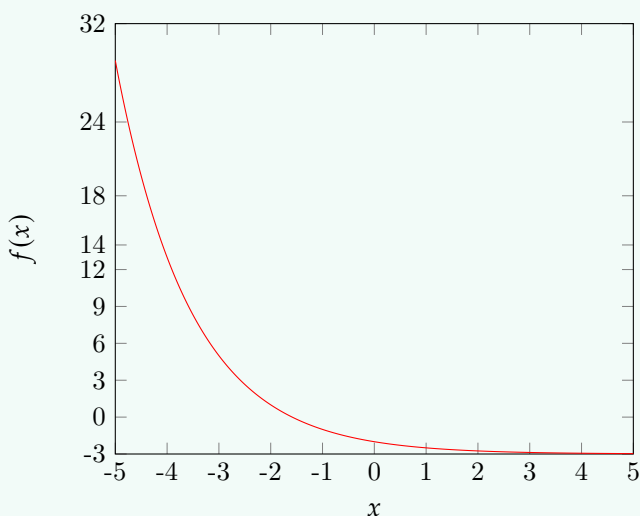
Domain: 4

Range: 6

Horizontal Asymptote: 12

Example 4.1.4 (Explain the transformation of g(x) from $f(x) = e^x$)

- $g(x) = -e^{x-3}$
- $g(x) = 3e^{-x} - 5$

Example 4.1.5 (6: Solve $3^{x+1} = 81$)

- $3^{x+1} = 3^4$
- $x + 1 = 4$
- $x = 3$

Example 4.1.6 (7: Solve $e^{-x^2} = (e^{x^2} \cdot \frac{1}{e^3})$)

- $e^{-x^2} = e^{2x} \cdot e^{-3}$
- $e^{-x^2} = e^{2x-3}$
- $-x^2 = 2x - 3$
- $x^2 + 2x - 3$
- $(x + 3)(x - 1) = 0$
- $x = -3, 1$

Example 4.1.7 (8: Between 9 AM and 10 PM cars arrive at burger king's drive-thru at the rate of 12 cars per hour (0.2 cars per minute). The following formula from statistics can be used to determine the probability that a car will arrive within t minutes of 9 PM)

$F(t) = 1 - e^{-2t}$

(a) 63%

(b) 99.7%

(c) graph

(d) other thing

Thanks for reading `dabloon.png`