

MA 16020 LESSON 26: INTRODUCTION TO FUNCTIONS OF SEVERAL VARIABLES (ALGEBRA REVIEW)

DOMAIN & RANGE OF SINGLE VARIABLE FUNCTIONS

Recall the following common Domains and Ranges:

- | | | |
|-----------------|------------------------------------|-----------------------------------|
| 1. $y = e^x$ | Domain: $(-\infty, \infty)$ | Range: $(0, \infty)$ |
| 2. $y = \ln(x)$ | Domain: $(0, \infty)$ | Range: $(-\infty, \infty)$ |

Note that $y = e^x$ and $y = \ln(x)$ are inverses of each other. Which mean the domain of the first function is the range of the second (and vice versa).

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|----------------------|------------------------------------|-----------------------------------|
| 3. $y = \sqrt{x}$ | Domain: $[0, \infty)$ | Range: $(-\infty, \infty)$ |
| 4. $y = \sqrt[3]{x}$ | Domain: $(-\infty, \infty)$ | Range: $(-\infty, \infty)$ |

Note: Let $y = \sqrt[n]{x} = x^{1/n}$.

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|------------------------|------------------------------------|-----------------------------------|
| • If n is even, then | Domain: $[0, \infty)$ | Range: $(-\infty, \infty)$ |
| • If n is odd, then | Domain: $(-\infty, \infty)$ | Range: $(-\infty, \infty)$ |

Techniques for finding the Domain:

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|---------------------------------------|---|
| • Given $\sqrt{?}$ then $? \geq 0$ | • Given $\ln ?$ then $? > 0$ |
| • Given $\frac{1}{?}$ then $? \neq 0$ | • Given $\frac{1}{\sqrt{?}}$ then $? > 0$ |

Exercise 1: Find the Domain and Range of the following:

1. $y = \sqrt{2x + 3}$

Domain:

Range:

2. $y = \sqrt{x^2 - 1}$

Domain:

Range:

3. $y = \ln(x^2 + 2x + 1)$

Domain:

Range:

4. $y = \frac{1}{x+4}$

Domain:

Range:

5. $y = \frac{1}{\sqrt{5x+1}}$

Domain:

Range:

6. $y = \frac{\sqrt{x-1}}{x^2+3x-4}$

Domain:

Range:

7. $y = \frac{\sqrt{2x-1}}{\ln(10x-5)}$

Domain:

Range:

8. $y = \sqrt[4]{7x + 4}$

Domain:

Range:

9. $y = \frac{\ln(x+2)\sqrt[4]{2x+1}}{\sqrt{x-6}}$

Domain:

Range: