Worksheet #1 **Name:** _____
Week 1: May/7/2024
MAT135: Calculus I
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Goals:

1. Introduction/Discussion about the course
2. Solve Worksheet Problems

Even/Odd functions
Given $x \in \mathbb{R}$, a function $f : \mathbb{R} \to \mathbb{R}$ is:

1. **Even** if $f(-x) = f(x)$. Such functions are symmetric about the y-axis.
2. **Odd** if $f(-x) = -f(x)$. Such functions are symmetric about the origin.
3. **Neither even nor odd** if 1 and 2 are both not true.

Problem 1. Are the following even or odd?

1. $f(x) = \dfrac{x^2 + 1}{3x^3 + x}$
2. $g(x) = |x| + 3$
3. $h(x) = \cos x$

Answer :

1. Odd
2. Even
3. Even

Problem 2. Given $f, g : \mathbb{R} \to \mathbb{R}$, determine the domain and range for the functions:

- $f(x) = \dfrac{\sqrt{x+2}}{x^2 - 2x - 15}$
- $g(x) = |x - 6| - 3$

Answer :

1. Domain: $[-2, 5) \cup (5, \infty)$ Range: $\mathbb{R}$
2. Domain: $\mathbb{R}$ Range: $[-3, \infty)$

Function Composition

Suppose $f, g : \mathbb{R} \to \mathbb{R}$ are functions such that Range(f) $\subseteq$ Domain(g). We define their composition, $g \circ f(x) = g(f(x)) : \mathbb{R} \to \mathbb{R}$.

Problem 3. Given $f(x) = \dfrac{x}{x+3}$ and $g(x) = \dfrac{2}{x}$ Find the domain of $g \circ f(x)$.

Answer : Refer to notes