MAT137 - Calculus with proofs

- Assignment #1 due on October 1.
  You should have received a submission link already.

- TODAY: Abs values and distances.

- MON: The idea of limit **(Videos 2.1, 2.2, 2.3)**
- WED: The definition of limit (Videos 2.5, 2.6)

Properties of absolute value

Let $a, b \in \mathbb{R}$. What can we conclude?

1. $|ab| = |a||b|$
2. $|a + b| = |a| + |b|$

If any of the conclusions is wrong, fix it.

Properties of inequalities

Let $a, b, c \in \mathbb{R}$. Assume $a < b$. What can we conclude?

1. $a + c < b + c$
2. $a - c < b - c$
3. $ac < bc$
4. $a^2 < b^2$
5. $1/a < 1/b$
6. $\sin a < \sin b$

If any of the conclusions is wrong, fix it.

Sets described by distance

Let $a \in \mathbb{R}$. Let $\delta > 0$.
What are the following sets? Describe them using intervals

1. $A = \{x \in \mathbb{R} \ : \ |x| < \delta\}$
2. $B = \{x \in \mathbb{R} \ : \ |x| > \delta\}$
3. $C = \{x \in \mathbb{R} \ : \ |x - a| < \delta\}$
4. $D = \{x \in \mathbb{R} \ : \ 0 < |x - a| < \delta\}$

Implications

Find *all* positive values of A, B, and C which make the following implications true.

1. $|x-3|<1 \implies |2x-6|<A$
2. $|x-3|<B \implies |2x-6|<1$
3. $|x-3|<1 \implies |x+5|<C$