MATH 145 Calculus for Engineering and Science I
Recitation 1

October 6th, 2025

1. Find all numbers x for which

    i. $5 - x^2 < 8$.

    ii. $(x-1)(x-3) > 0$.

    iii. $x^2 + x + 1 > 2$.

    iv. $\left(x - \frac{1}{2}\right)\left(x - \sqrt{2}\right) > 0$.

    v. $x + 3^x < 4$.

2. Express each of the following without absolute value signs, treating various cases separately when necessary:

    i. $|a + b| - |b|$

    ii. $\big||x| - 1\big|$

    iii. $|x| - |x^2|$

    iv. $a - |a - |a||$

3. Prove the following formulas by induction:

    i. $1^2 + \cdots + n^2 = \frac{1}{6}n(n+1)(2n+1)$

    ii. $1^3 + \cdots + n^3 = (1 + \cdots + n)^2$

4. Prove that if $x = p + \sqrt{q}$ where p and q are rational, and m is a natural number, then $x^m = a + b\sqrt{q}$ for some rational a and b.