

**Midterm 1**  
**12.11.09**

**Name:**

**Exercise 1.** Show, that the following sequence is increasing:

$$a_n = \frac{2n-1}{2n+3}.$$

**Solution:**

**Exercise 2.** Find the limit of the sequence:

$$a_n = \frac{2n^2 + 4n - 1}{n^3 - 6n^2 + n - 3}, \quad n \geq 7.$$

**Solution:**

**Exercise 3.** Perform the following operation and express the result in the standard form  $a + bi$ :

$$\frac{2 - i}{3 + 2i}.$$

**Solution:**

**Exercise 4.** Solve the following inequality:

$$|x| + |x - 5| < 9.$$

**Solution:**

**Exercise 5.** Find the limit of the sequence:

$$a_n = \frac{\sin(n) + 2 \cos(n)}{\sqrt{n}}.$$

**Solution:**

**Exercise 6.** Find the limit of the sequence:

$$a_n = \sqrt[n]{(2 \cdot 2^n) + 3^n}.$$

**Solution:**