

# MAC 2311 Recitation 1 Notes

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## 1 Problems

**Problem 1:** Simplify

$$\frac{\left(\frac{1}{x^2} - \frac{1}{x}\right)}{\left(\frac{1}{x^2} + \frac{1}{x}\right)} \quad (1)$$

**Solution:**

$$\frac{\left(\frac{1}{x^2} - \frac{1}{x}\right)}{\left(\frac{1}{x^2} + \frac{1}{x}\right)} = \frac{\frac{1}{x} \left(\frac{1}{x} - 1\right)}{\frac{1}{x} \left(\frac{1}{x} + 1\right)} = \frac{\left(\frac{1}{x} - 1\right)}{\left(\frac{1}{x} + 1\right)} = \frac{\left(\frac{1-x}{x}\right)}{\left(\frac{1+x}{x}\right)} = \left(\frac{1-x}{x}\right) \left(\frac{x}{1+x}\right) \quad (2)$$

$$\therefore \frac{\left(\frac{1}{x^2} - \frac{1}{x}\right)}{\left(\frac{1}{x^2} + \frac{1}{x}\right)} = \frac{1-x}{1+x} \quad (3)$$

□

**Problem 2:** Solve the rational inequality

$$\frac{x-5}{x+6} \leq 0 \quad (4)$$

**Solution:**

$\therefore$  the denominator must be greater than 0,

$$\Rightarrow x+6 > 0 \quad (5)$$

$$\therefore x > -6 \quad (6)$$

On the other hand, we see that  $x-5 \leq 0$ .

$$\therefore x \leq 5 \quad (7)$$

$$\therefore (-6, 5] \quad (8)$$

□

**Problem 3:** Express the following as a rational number.

$$e^{\ln|9| - \ln|2|} \quad (9)$$

**Solution:**

$$\therefore \ln|9| - \ln|2| = \ln\left|\frac{9}{2}\right| \quad (10)$$

$$\therefore e^{\ln|9/2|} = \frac{9}{2} \quad (11)$$

□

**Problem 4:** Simplify the following so that the power of  $a \in \mathbb{Z}$ .

$$\sqrt{3a} \left( \sqrt{6a^5} + \sqrt{3a^3} \right) \quad (12)$$

**Solution:**

$$\sqrt{3a} \left( \sqrt{6a^5} + \sqrt{3a^3} \right) = \sqrt{(3)(6)a^6} + \sqrt{(3)(3)a^4} \quad (13)$$

$$\Rightarrow \sqrt{18a^3} + \sqrt{9a^2} = \sqrt{(2)(9)a^3} + 3a^2 \quad (14)$$

$$\therefore \sqrt{3a} \left( \sqrt{6a^5} + \sqrt{3a^3} \right) = 3\sqrt{2}a^3 + 3a^2 \quad (15)$$

□

**Problem 5:** Solve

$$|7x - 3| = 46 \quad (16)$$

**Solution:**

So either,

Case I:

$$7x - 3 = 46 \quad (17)$$

Or,

Case II:

$$7x - 3 = -46 \quad (18)$$

The, for case I,

$$x = 7 \quad (19)$$

And for case II,

$$x = -\frac{43}{7} \quad (20)$$

$$\therefore x = \left\{ \begin{array}{l} 7 \\ -\frac{43}{7} \end{array} \right. \quad (21)$$

□

**Problem 6:** Solve

$$|7x - 3| < 46 \quad (22)$$

**Solution:**

$$-46 < 7x - 3 < 46 \quad (23)$$

$$\Rightarrow -46 + 3 < 7x < 46 + 3 \quad (24)$$

$$\Rightarrow -43 < 7x < 49 \quad (25)$$

$$\therefore -\frac{43}{7} < x < 7 \quad (26)$$

□

**Problem 7:** Sketch the graph for  $y = -\sin\left(x + \frac{\pi}{6}\right)$

**Solution:**

For  $y = \sin(x)$ ,

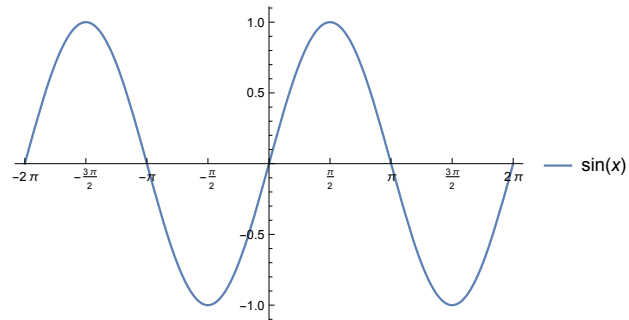


Figure 1:

For  $y = -\sin(x)$ ,

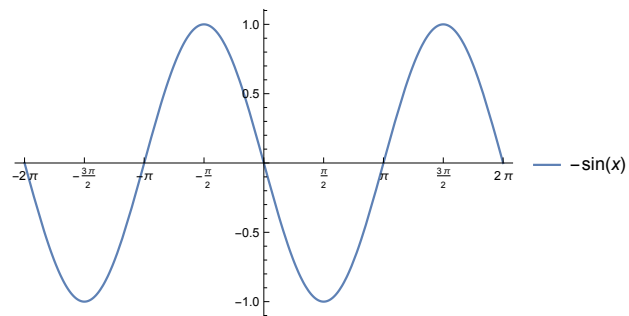


Figure 2:

Thus, for  $y = -\sin\left(x + \frac{\pi}{6}\right)$

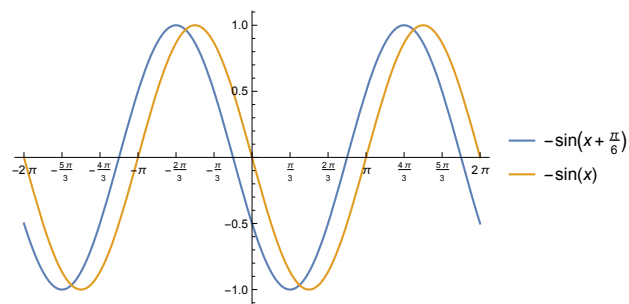


Figure 3:

Is shown

□

