Math 190 Quiz 1: Friday September 25

The quiz is 20 minutes long and has two questions. No calculators or other aids are permitted. Show all of your work for full credit.

Questions:

1. Evaluate

$$\cos\left(\frac{\pi}{3}\right) - \sin\left(\frac{5\pi}{3}\right).$$

Solution:
Using either special triangles or the unit circle we see that

$$\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$$
$$\sin\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{2}$$

and so together we see

$$\cos\left(\frac{\pi}{3}\right) - \sin\left(\frac{5\pi}{3}\right) = \frac{1+\sqrt{3}}{2}.$$

2. Find the domain of the function

$$f(x) = \frac{\sqrt{x+1}}{2x^2 - 6x - 8}.$$

Solution: We have two conditions. We require that $x+1 \geq 0$ so that we do not take the square root of a negative number. We also require that $2x^2 - 6x - 8 \neq 0$ so that we are not dividing by zero. The first gives

$$x \geq -1$$

and the second

$$\begin{aligned} 2x^2 - 6x - 8 &\neq 0 \\ 2(x^2 - 3x - 4) &\neq 0 \\ 2(x-4)(x+1) &\neq 0 \end{aligned}$$

and so $x \neq 4$ and $x \neq -1$. Putting our conditions together gives the domain:

$$\{x \in \mathbb{R} : x \geq -1 \text{ and } x \neq -1 \text{ and } x \neq 4\}$$

or equivalently

$$\{x \in \mathbb{R} : x > -1 \text{ and } x \neq 4\}$$

or in another way

$$(-1, 4) \cup (4, \infty).$$