Math 243 Midterm 2

April 9, 2020

- Write your solutions and upload them on Gradescope, just like your homework assignments. You can write your solutions on the exam pages or on separate sheets of paper, your choice.
- Only use the resources allowed on the exam honor code certification form.
- Be sure to include the exam honor code certification form with your solutions. If you are unable to print it, copy the form by hand.
- Show enough work that your solution would convince a skeptical peer that your answer is correct.
- The questions are ordered by topic, not by difficulty.
- Each question is worth the same number of points.

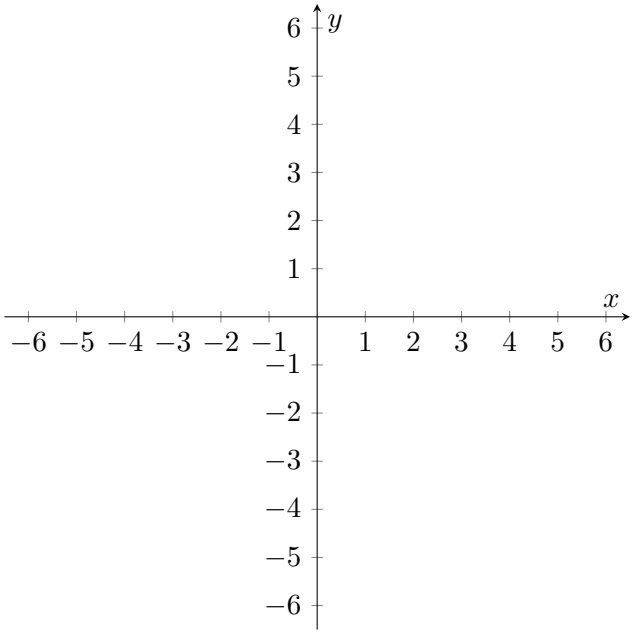
1. Consider the triangle determined by the points $P(2, -1, 0)$, $Q(4, 1, 1)$, $R(4, -5, 5)$.
   (a) Find the lengths of the three sides of the triangle.

   (b) Is it a right triangle?

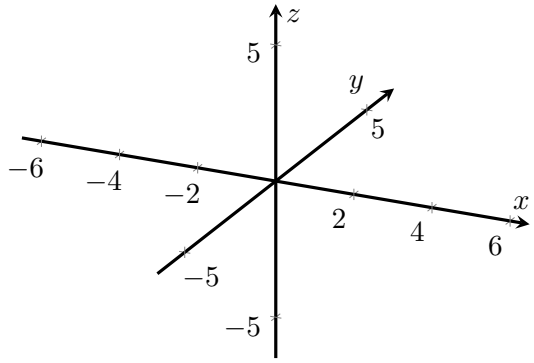
   (c) Is it an isosceles triangle?

2. Consider the lines $x + 2y = 7$ and $5x - y = 3$ in the plane. Find the acute angle between the lines.

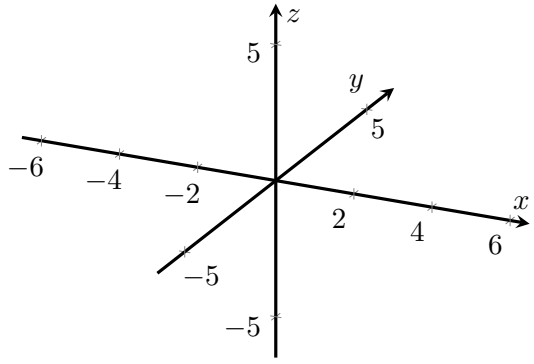
3. (a) Sketch the graph of $y = \sin x$ as a curve in $\mathbb{R}^2$.



(b) Sketch the graph of $y = \sin x$ as a surface in $\mathbb{R}^3$. Describe your sketch if needed.



(c) Sketch the graph of $z = \sin y$ as a surface in $\mathbb{R}^3$. Describe your sketch if needed.



4. Consider the curve $y = \sin x + \sin 2x$ in $\mathbb{R}^2$. Find its curvature in terms of x.