# EXAM 1 - TRIGONOMETRY - SUMMER 2021 - NEWTON

**Instructions.** You may work on this exam on your own time, using any resource you like (open notes, open book, open Internet). Please do not post the questions online. I will check if the questions have been posted, and solutions matching those online solutions will receive a zero. You still need to understand the material yourself, even if you are looking up some things. Show all your work and explain your solutions fully in order to get full credit. Copying from the book without understanding is not enough, and many internet solutions are outright wrong or missing information and explanations. Avoid using a calculator. You won't need one, since you don't have to simplify your numerical answers. **Leave your answers exact, do not convert to decimal** (as in, leave things with the square roots, fractions, $e$, $\pi$).

Your work on this exam should be your own. Working with other students can get you both a zero. Trust and believe in yourself over other students and the internet.

When the question asks for an explanation of the work or your process, that means you should give an explanation in words, in addition to the mathematical work you showed to get to the answer. However, this isn't an English test, I don't care about whether it's a complete sentence, or whether you mispelled something, had bad grammar, etc. As long as you give some sort of correct explanation in words, it will be fine.

Good luck! Do your best! You'll do great.

(1) Use the information given in the diagram to solve both right triangles. Give a reason for each step of your solution. Don't use a calculator, leave your answers exact. Explain your strategy for solving the problem in your own words.
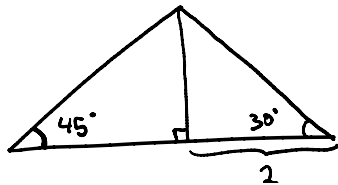
(2) You and your friend are estimating the height of the DVC math building. You stand north of the building and your friend stands east of the building. You are the same distance from the building, and you are 10 feet apart from each other. You measure the angle of elevation to the top of the building to be 60 degrees. How tall is the building? Show all your work, explain each step.

(3) Simplify the expression as much as possible: without using a calculator: $2\sin(\pi) + \cos(\pi) + \sin\left(\frac{\pi}{6}\right)$. Show all your work, justify each step, leave your answer exact. Is it possible to find an angle $\theta$ so that $\sin(\theta)$ is equal to your result from simplifying the expression? Why or why not? If it is possible, what is that angle $\theta$?