

EXAM 2 - TRIGONOMETRY - SPRING 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 , π).

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 misspelled 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) Evaluate the expression without using a calculator: $\tan\left(\sin^{-1}\left(\frac{3}{5}\right)\right)$. Show all your work. Give a reason for each step.
- (2) Graph one cycle of the function $f(\theta) = 3 \cos(\theta - \pi) + 1$. Find the amplitude, vertical and horizontal shift, period, zeros, and asymptotes. How could we restrict the domain so that this function has an inverse? (Many answers are possible, all reasonable answers will receive full credit.) Using your graph and choice of domain, graph the inverse function for this function.

- (3) You're standing outside in the sun, and you're 5 feet tall. You measure your shadow to be 7 feet long. Next to you is a dog that casts a shadow 2 feet long. How tall is the dog? *[Hint: draw two triangles. They have something in common!]*

- (4) Simplify the expression as much as possible:

$$\frac{\cos(\theta)}{\cos(\theta)\cot(\theta) + \sin(\theta)}.$$

Where (meaning, what values of θ) is this expression equal to 1? (For θ between -2π and 2π .)