

Final Exam

You have two hours. Please show all your work; if I can't follow your logic, I can't give you partial credit.

Your answers should be exact values; please do not answer with decimals.

You are allowed both sides of one 3x5 index card.

1. (10 pts) Two supplementary angles measure $x^2 + 63$ degrees and $2x + 18$ degrees. Find the **positive** value of x .

2. A right triangle has a hypotenuse measuring 41 meters and one side measuring 40 meters. Let θ be the angle formed by the 41-meter side and the 40-meter side.

(a) (10 pts) Compute $\sin \theta$, $\cos \theta$, and $\tan \theta$.

(b) (10 pts) Find $\sin(2\theta)$ and $\cos(2\theta)$.

3. (10 pts) A right triangle has an angle of 60 degrees opposite a side of $14\sqrt{3}$ meters. Draw this triangle (your drawing need not be to scale); compute the other sides and angles; and label them correctly.
4. Suppose that $\sin \theta = -2/9$ and θ lies in the third quadrant.
- (a) (10 pts) Find $\cos \theta$. Remember to use the correct sign.
- (b) (10 pts) Find $\tan \theta$, $\cot \theta$, $\sec \theta$, and $\csc \theta$.

5. (10 pts) Consider the tangent curve given by $f(x) = -7 \tan\left(5x - \frac{\pi}{2}\right) + 10$. Find **three of**: the amplitude/vertical stretching factor, the period, the phase shift, and the midline equation.

6. (10 pts) Find $\tan\left(\arcsin(-1) + \arccos\left(\frac{\sqrt{2}}{2}\right)\right)$.

7. (10 pts) Find $\sin\left(\frac{\pi}{4} + \frac{\pi}{3}\right)$ and $\cos\left(\frac{\pi}{3} - \frac{\pi}{4}\right)$.

8. (10 pts) Find all solutions θ between $0 \leq \theta < 2\pi$ of the equation $\tan^2 \theta = \tan \theta$.

It's been a pleasure having you this semester. Best of luck in whatever you may do next. :)