★2 errors to find★

proving trig identities

- Is it an identity? If so, then it's true for all possible angles. Try plugging in an angle to see if it's true.

  Protip: Avoid special angles like 90°, 45°, etc.

  Protip: If you're not sure, try another angle!

- If it's <u>not</u> an identity, disprove it by showing that there is an angle it doesn't work for. Plug in an angle that doesn't work and show that the equation is false.

  Example: Prove that $\sin(2\theta) = 2\sin(\theta)$ is not an identity.

  if $\theta = 78°$, then $\sin(2\theta) = \sin(2 \cdot 78°) \approx 0.4067$

  but $2\sin(\theta) = 2 \cdot \sin(78°) \approx 1.956$

  the equation does not hold for $\theta = 78°$.

- If it <u>is</u> an identity, prove it like this:

  This is not the only way to prove things!

  ① Start with one side of the equation.

  Protip: it's usually easier to start with the less complicated side.

  ② Do legal algebra moves to change your expression into equivalent expressions, ending up at the other side of the equation. Make sure you can explain why each step works! Some options:

  - start by converting everything to sin & cos ← highly recommended!!
  - algebra / simplifying moves
  - use trig identities that were proven previously
  - you can replace a 1 with $\sin\theta + \cos\theta$
  - multiply by a clever form of 1

Example of trig proof

Proof of: $\sec\theta(\sec\theta-\cos\theta)=\tan^2\theta$

Proof: $\sec\theta(\sec\theta-\cos\theta)$ ← start with complex side

$= \frac{1}{\cos\theta}\left(\frac{1}{\cos\theta}-\cos\theta\right)$ ↘ replace with sin & cos

$= \frac{1}{\cos\theta}\left(\frac{1}{\cos\theta}-\frac{\cos\theta}{1}\cdot\frac{\quad}{\quad}\right)$

multiply by clever form of 1 to get common denominator ↙

$= \frac{1}{\cos\theta}\left(\frac{1}{\cos\theta}-\frac{\cos^2\theta}{\cos\theta}\right)$ ↙ subtract fractions

$= \frac{1}{\cos\theta}\left(\frac{1-\cos^2\theta}{\cos\theta}\right)$ ↙ multiply fractions

$= \frac{1-\cos^2\theta}{\cos^2\theta}$ ↙ replace 1 with $\sin^2+\cos^2$

$= \frac{\sin^2\theta+\cos^2\theta-\cos^2\theta}{\cos^2\theta}$ ↙ combine like terms

$= \frac{\quad}{\cos^2\theta}$ ↙ property of exponents

$= \left(\frac{\sin\theta}{\cos\theta}\right)^2$ ↙ because $\tan=\frac{\sin}{\cos}$

$= \tan^2\theta$

□

★ Fill in the blanks! ★

Leave space for examples of solving trig equations! (or get an additional sheet of pastel paper)