# Lecture 31: Proving identities

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# Question 1.

Which of the expressions below does not simplify to 1?

A  $sin(x) cos(x) tan(x) + cos^2(x)$ B  $sin^2(2x) + cos^2(2x)$ C sin(x) csc(x)D  $cos^2(x) - sin^2(x)$ E  $tan^2(x) - sec^2(x)$ 

4 A N

- B

# Question 1.

Which of the expressions below does not simplify to 1?

A  $sin(x) cos(x) tan(x) + cos^{2}(x)$ B  $sin^{2}(2x) + cos^{2}(2x)$ C sin(x) csc(x)

$$D \cos^2(x) - \sin^2(x)$$

$$\mathsf{E} \operatorname{tan}^2(x) - \operatorname{sec}^2(x)$$

We can write

$$\tan^{2}(x) - \sec^{2}(x) = \frac{\sin^{2}(x)}{\cos^{2}(x)} - \frac{1}{\cos^{2}(x)}$$
$$= \frac{\sin^{2}(x) - 1}{\cos^{2}(x)}$$
$$= \frac{-\cos^{2}(x)}{\cos^{2}(x)}$$
$$= -1$$

0

If we try  $x = \pi/4$ , we see that  $\cos^2(\pi/4) - \sin^2(\pi/4) = 0$ , thus there is at least one value of x for which D fails.

## Question 2.

Which of the following are correct? (There are several right answers, but you will only need to select one.)

A sin(x) = sin(-x)B -sin(x) = sin(-x)C -sec(x) = sec(-x)D tan(x) = tan(-x)E -tan(x) = tan(-x)

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## Question 2.

Which of the following are correct? (There are several right answers, but you will only need to select one.)

- A sin(x) = sin(-x)
- $\mathsf{B} \sin(x) = \sin(-x)$
- $\mathsf{C} \sec(x) = \sec(-x)$
- $D \tan(x) = \tan(-x)$
- E tan(x) = tan(-x)

We have sin(-x) = -sin(x) and cos(-x) = cos(x). Thus, sec(-x) = 1/cos(-x) = 1/cos(x) = sec(x) and tan(-x) = sin(-x)/cos(-x) = -sin(x)/cos(x) = -tan(x). Thus B and E are correct.

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## Question 3.

Which of the following is equal to  $\sec(x) - \cos(x)$ ?

A 1

- $\mathsf{B} \sin(x)\tan(x)$
- C sec(x)
- $D \sin^2(x) \sec(x)$
- $E \sin(x) \sec^2(x)$

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## Question 3.

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Which of the following is equal to \sec(x) - \cos(x)?
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A 1

- $B \sin(x)\tan(x)$
- C sec(x)
- $D \sin^2(x) \sec(x)$
- $E \sin(x) \sec^2(x)$

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