

Monday, February 2

Clicker Questions

Clicker Question 1

Double-angle formula

Which identity is a correct identity?

- A. $\cos 2x = 2 \cos^2 x - 1$
- B. $\cos 2x = \cos^2 x - \sin^2 x$
- C. $\cos 2x = 1 - 2 \sin^2 x$
- D. $\cos 2x = 2 \sin x \cos x$
- E. none of the above

Three correct answers!

These formulas are all equivalent, because

$$\sin^2 x + \cos^2 x = 1.$$

Note that answers A and C can be rewritten as

$$\cos^2 x = \frac{1}{2}(1 + \cos 2x)$$

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

Answer D was misleading: actually $\sin 2x = 2 \sin x \cos x$.

Clicker Question 2

That other identity

Which of the following identities is correct?

A. $\cot^2 x + \csc^2 x = 1$

B. $\tan^2 x + \sec^2 x = 1$

C. $\cot^2 x - \csc^2 x = 1$

D. $\sec^2 x - \tan^2 x = 1$

E. $\tan^2 x - \sec^2 x = 1$

Easier than memorizing!

Divide both sides of

$$\sin^2 x + \cos^2 x = 1$$

by $\cos^2 x$ to get

$$\tan^2 x + 1 = \sec^2 x.$$

On the "Helpful resources" course web page

<http://www.math.ubc.ca/~gerg/index.shtml?101help>
you'll find a very helpful link "geometry and trigonometry".

Clicker Question 3

Trickier than it seems

Evaluate $\int \tan x \, dx$.

- A. $(\tan x)/(\sec x) + C$
- B. $-\ln |\cos x| + C$
- C. $\sec^2 x + C$
- D. $\ln |\sec x + \tan x| + C$
- E. $1/(1 + x^2) + C$

Or, if you prefer,

$$\begin{aligned}\ln \left| \frac{1}{\cos x} \right| + C \\ = \ln |\sec x| + C.\end{aligned}$$

A sneaky substitution: $u = \cos x$

$$\begin{aligned}\int \tan x \, dx &= \int \frac{\sin x \, dx}{\cos x} \\ &= \int \frac{-du}{u} \\ &= -\ln |u| + C \\ &= -\ln |\cos x| + C.\end{aligned}$$

Midterm #1 Information

The course web page is your friend

- Our section's median was 29 out of 45, or 64%.
- This is very similar to historical medians in MATH 101.
- Our section's **term marks will be scaled** to match our section's median on the final exam. So if we do well on the final exam, these grades could be even higher!
- Other section's midterm medians aren't relevant to us.
- Solutions and grading scheme on section web page.
- Requests for regrades must be **in writing**, and you must say **specifically** what part of the grading scheme wasn't applied correctly to your paper.
- Please, no midterm questions today. Think about it on your own first, and check the solutions and grading scheme.
- Nine piles, alphabetized by last name:

AB C DEF GHIJ KL MNO PQR ST U-Z