Today

- Inverse trig review
- Derivatives of inverse (trig) functions
- Office hours next week: MWTh 1:30-3:30

Triangle with two sides of fixed length, angle between them changes.

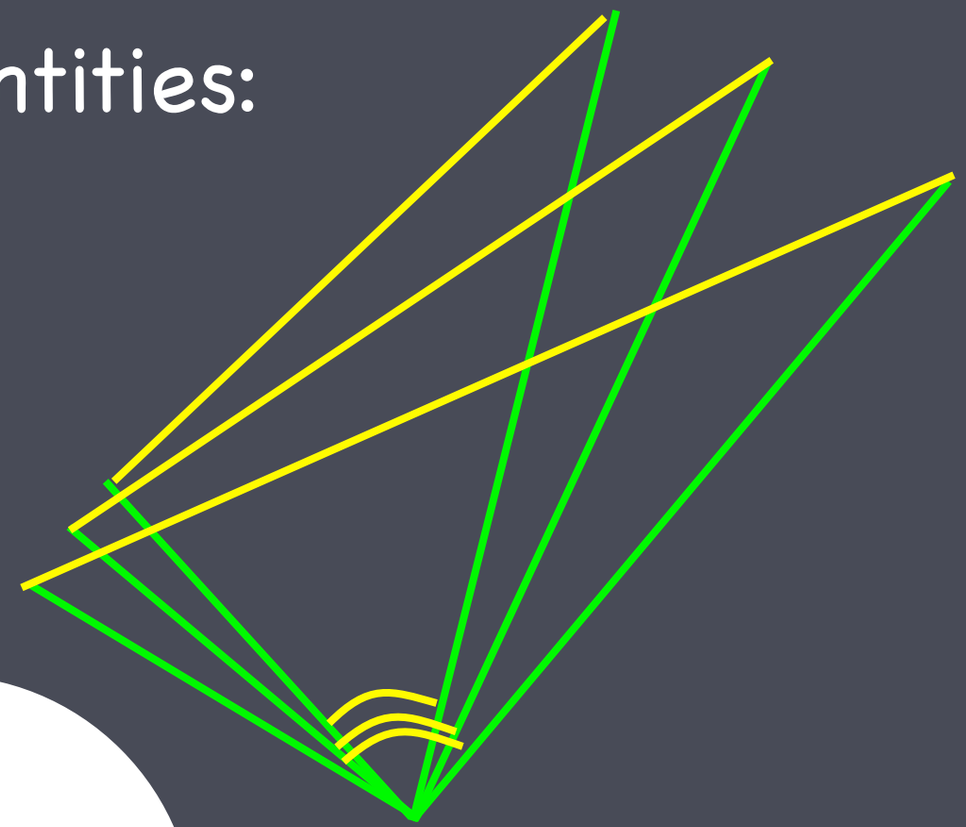
Relate the two changing quantities:

(A) $a^2 = b^2+c^2$

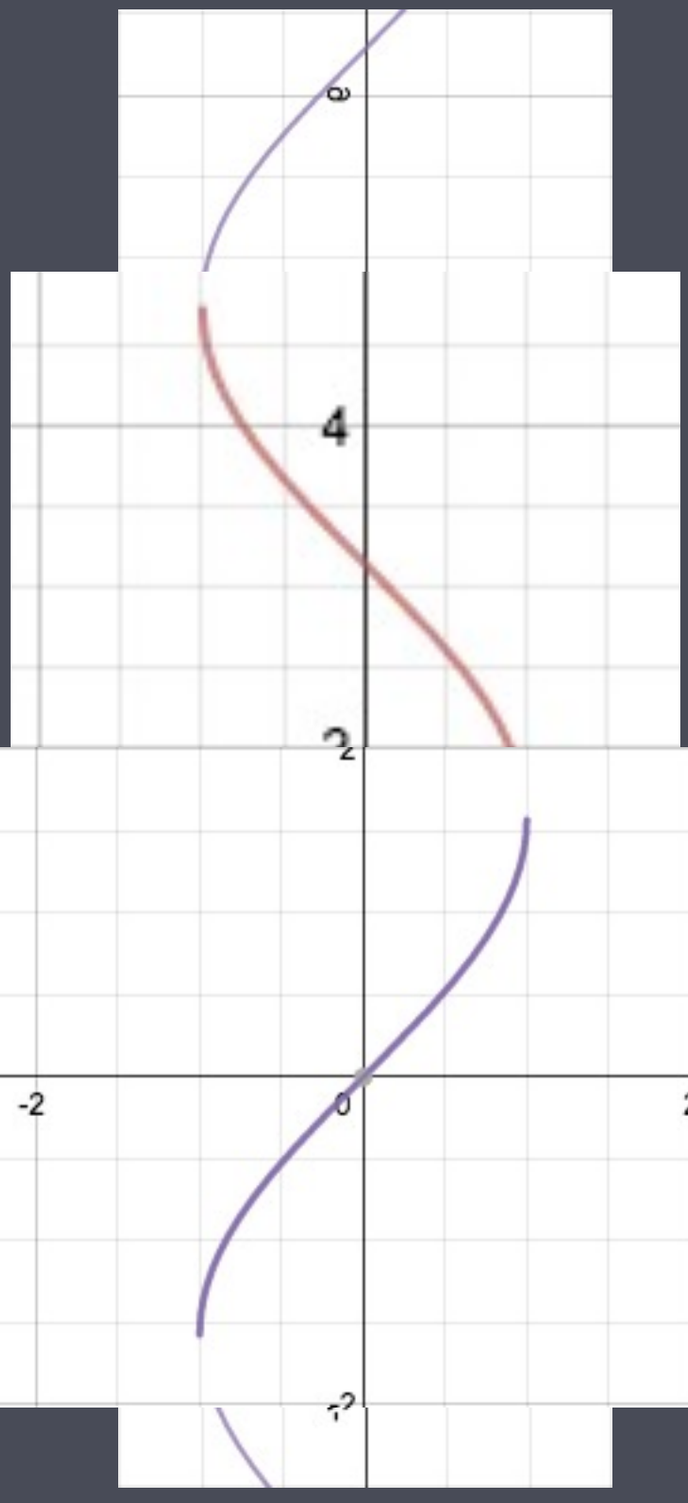
(B) $a^2 = b^2+c^2 - 2bc\ \cos(\theta)$

(C) $a/\sin(A) = b/\sin(B)$

(D) $\sin(\theta) = a/b$



Inverse trig



- $f(x) = \sin(x) \dashrightarrow f^{-1}(x) = \arcsin(x)$
- Flip sin(x) about y=x.
- Many angles (x) have the same sin(x) so mirror image is not a function - must choose favourite values for arcsin.

not arcsin(x)

arcsin(x)

The domain of arcsin is...

(A) $(-\pi/2, \pi/2)$

(B) $[-\pi/2, \pi/2]$

(C) $[0, \pi]$

(D) $(-1, 1)$

(E) $[-1, 1]$

The domain of arcsin is...

(A) $(-\pi/2, \pi/2)$

(B) $[-\pi/2, \pi/2]$

(C) $[0, \pi]$

(D) $(-1, 1)$

(E) $[-1, 1]$

The range for arcsin(x) is...

(A) [-1, 1]

(B) [0, π]

(C) [-π, π]

(D) [-π/2, π/2]

(E) (-infinity, infinity)

The range for arcsin(x) is...

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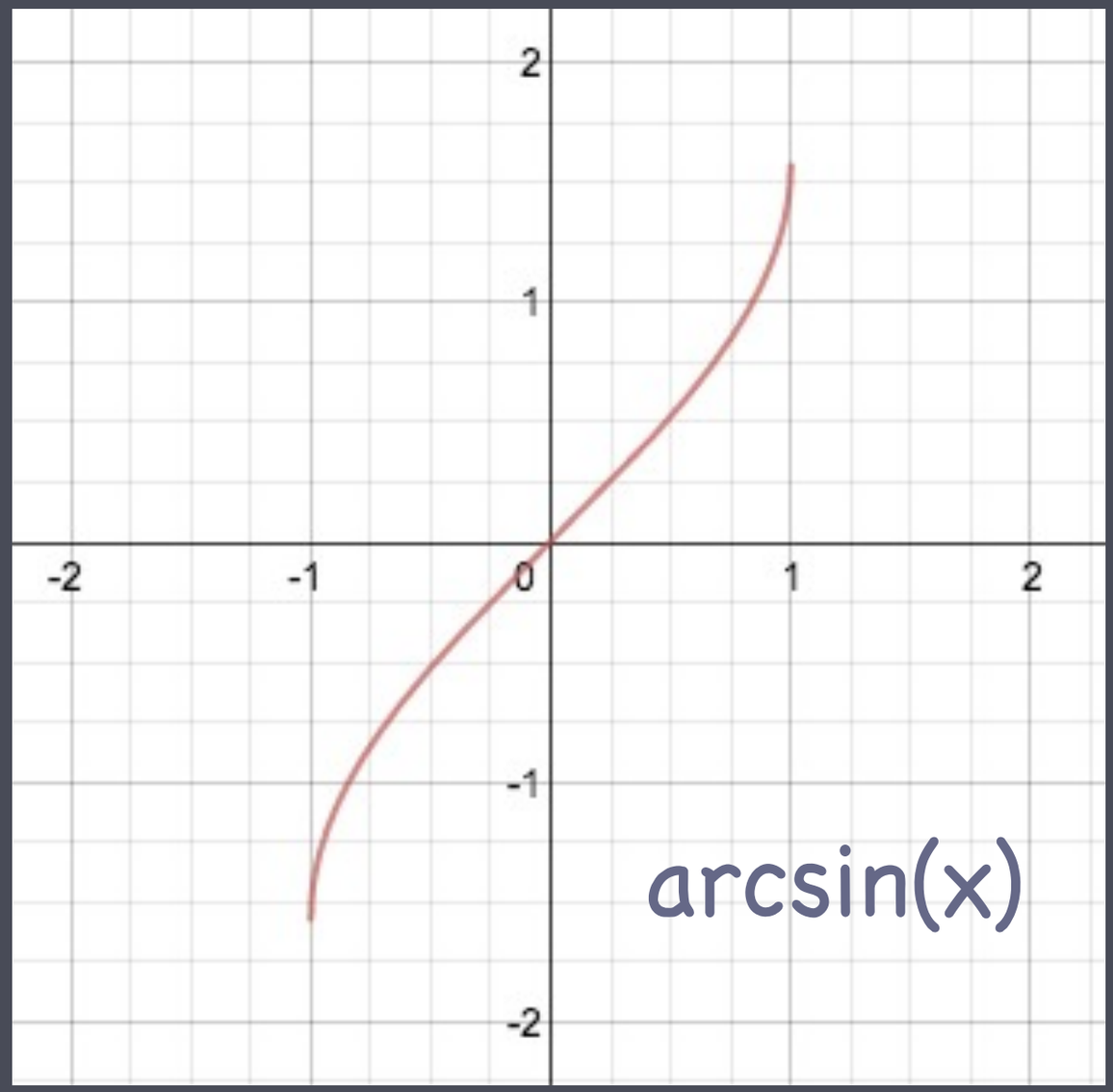

The domain for arccos(x) is...

(A) [-pi/2, pi/2]

(B) [-1, 1]

(C) [0, pi]

(D) [0, 1]

(E) (-infinity, infinity)

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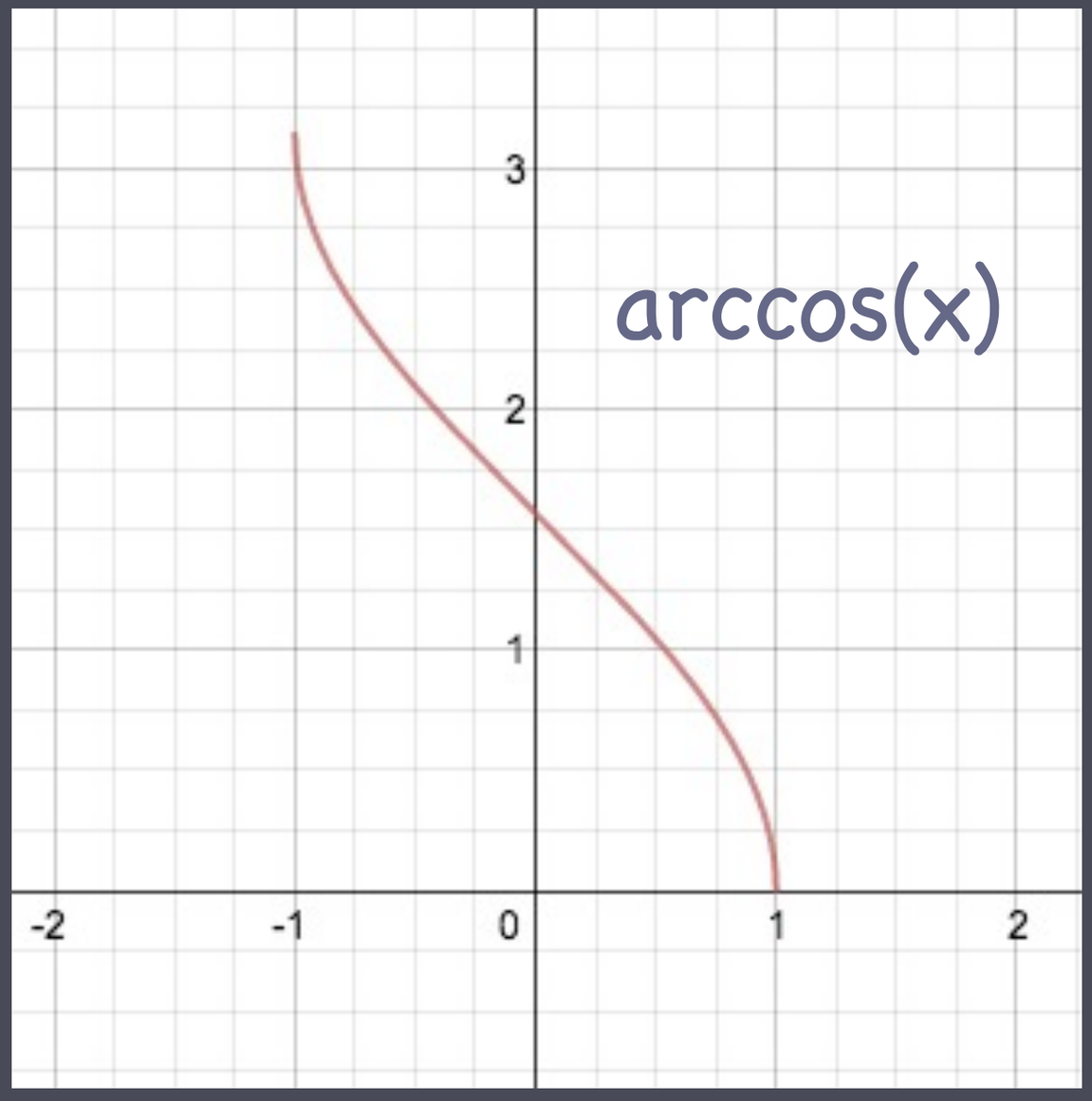

The domain for arctan(x) is...

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(B) (-pi/2, pi/2)

(C) [0, pi]

(D) [0, infinity]

(E) (-infinity, infinity)

The domain for arctan(x) is...

(A) [-pi/2, pi/2]

(B) (-pi/2, pi/2)

(C) [0, pi]

(D) [0, infinity]

(E) (-infinity, infinity)

The range for arctan(x) is...

- (A) [-pi/2, pi/2]
- (B) (-pi/2, pi/2)
- (C) [0, pi]
- (D) [0, infinity]
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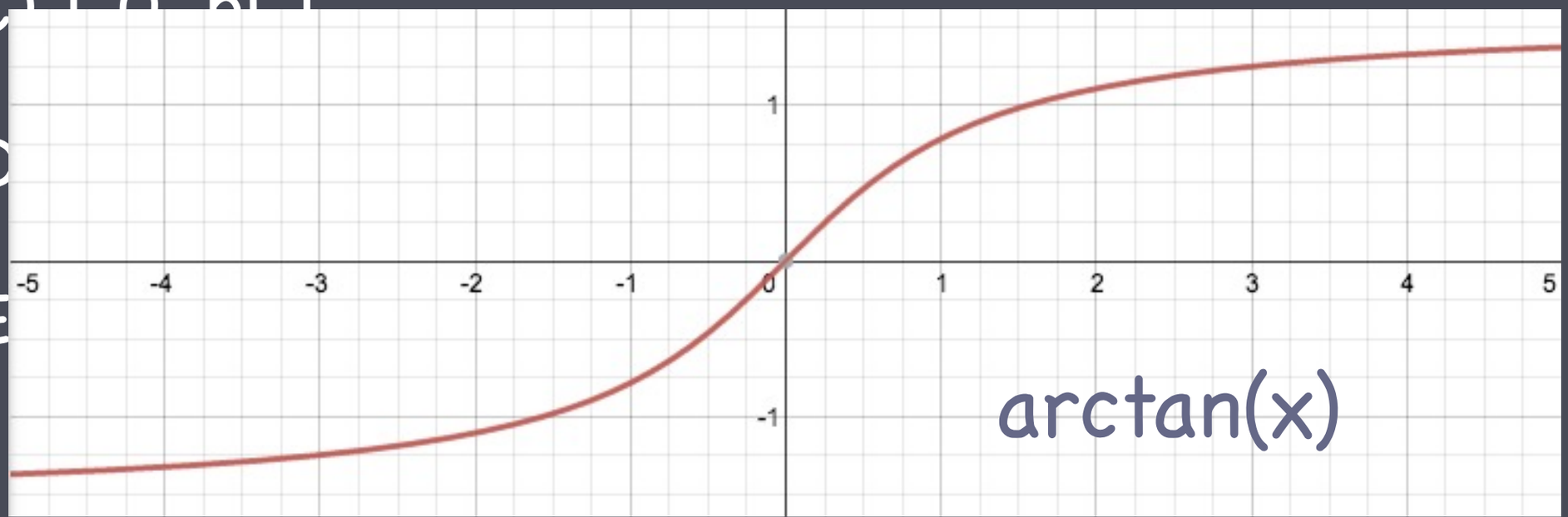


Derivatives of inverse trig functions

- For ANY inverse function, find its derivative implicitly...
- y = arcsin(x)
- sin(y) = x <--- rewrite in inverted mode
- cos(y) y′ = 1 <--- take implicit derivative
- y′ = 1/cos(y) = 1/cos(arcsin(x)) <--- solve for y′

$\cos(\arcsin(x)) = \ldots$

(A) $\sqrt{1-x^2}$

(B) $1/\sqrt{1-x^2}$

(C) $x/\sqrt{1-x^2}$

(D) $\sqrt{1-x^2}/x$

(E) $1/x$

cos(arcsin(x)) = . . .

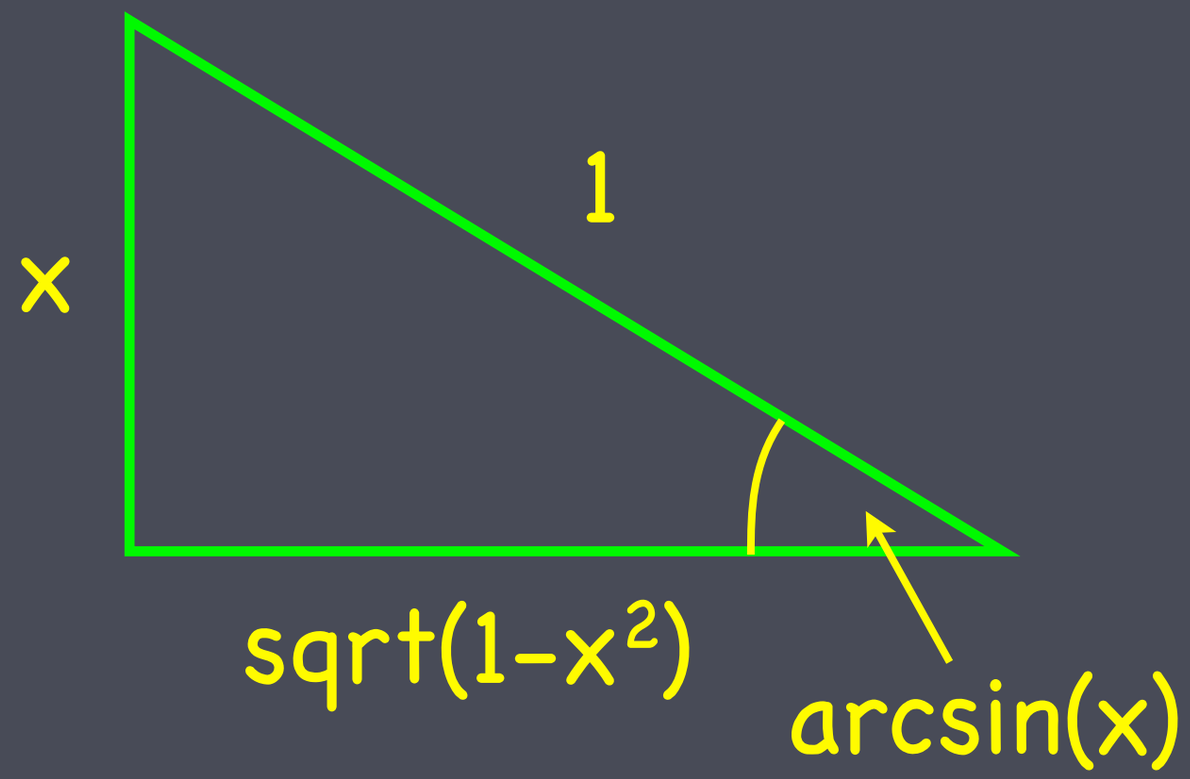
(A) sqrt(1-x^2)

(B) 1/sqrt(1-x^2)

(C) x/sqrt(1-x^2)

(D) sqrt(1-x^2)/x

(E) 1/x



Derivatives of inverse trig functions

- For any inverse function, find its derivative implicitly...
  - $y = \arcsin(x)$
  - $\sin(y) = x$ <--- rewrite in inverted mode
  - $\cos(y)\, y' = 1$ <--- take implicit derivative
  - $y' = 1/\cos(y) = 1/\cos(\arcsin(x))$ <--- solve for y'
  - $y' = 1/\sqrt{1-x^2}$

What is the derivative of y=arccos(x)?

(A) sqrt(1-x^2)

(B) 1/sqrt(1-x^2)

(C) x/sqrt(1-x^2)

(D) -1/sqrt(1-x^2)

(E) 1/x

What is the derivative of y=arccos(x)?

(A) sqrt(1-x^2)

(B) 1/sqrt(1-x^2)

(C) x/sqrt(1-x^2)

(D) -1/sqrt(1-x^2)

(E) 1/x