Trig Identities (6.1) pg296 day 1

fight or flight

men & women

Cameron & Sarah

Judith & left turn

Trig Identities (6.1) pg296 day 1

20. The Canadian National Historic Windpower Centre, at Etzikom, Alberta, has various styles of windmills on display. The tip of the blade of one windmill reaches its minimum height of 8 m above the ground at a time of 2 s. Its maximum height is 22 m above the ground. The tip of the blade rotates 12 times per minute.

a) Write a sine or a cosine function to model the rotation of the tip of the blade.

b) What is the height of the tip of the blade after 4 s?

c) For how long is the tip of the blade above a height of 17 m in the first 10 s?

, 20, 21

22

8

per = 5s 1

$\frac{2\pi}{5}$ $h(t) = -7\cos\frac{2\pi}{5}(t-2)+15$

Assignment due tomorrow

17. An electric heater turns on and off on cyclic basis as it heats the water in a tub. The water temperature, T, in deg Celsius, varies sinusoidally with time in minutes. The heater turns on when temperature of the water reaches 34 °C and turns off when the water tempera is 43 °C. Suppose the water temperat drops to 34 °C and the heater turns o After another 30 min the heater turns and then after another 30 min the hea starts again.

a) Write the equation that expresses temperature as a function of time.

b) Determine the temperature 16 min after the heater first turns on.

21. In a 366-day year, the average dai maximum temperature in Vancou British Columbia, follows a sinus pattern with the highest value of on day 208, July 26, and the lowe of 4.2 °C on day 26, January 26.

a) Use a sine or a cosine functio the temperatures as a function in days.

b) From your model, determine t temperature for day 147, May

c) How many days will have an maximum temperature of 21.0 higher?

Trig Identities (6.1) pg296 day 1

ex1: Solve $1-\cos^2 x = 3\sin x - 2$

$0 = \cos^2 x + 3\sin x - 3$

we don't know how to do this

we need some new strategies for solving equations

we'll need to make some substitutions

let's have a look see how trig identities can help us

Trig Identities (6.1) pg296 day 1

ex2: Solve $2x = \frac{4x+6}{2} - 3$ ×2 ×2

$4x = 4x + 6 - 6$

$4x = 4x$

$0 = 0$

∞ solutions

Some equations are always true for all values in the domain.

These are called **identities**.

Trig Identities (6.1) pg296 day 1

ex3: Prove that $\tan\theta = \frac{\sin\theta}{\cos\theta}$ is an identity.

LS = tanθ

$= \frac{y}{x}$

RS = $\frac{\sin\theta}{\cos\theta}$

$= \frac{\frac{y}{r}}{\frac{x}{r}}$

$= \frac{y}{r} \times \frac{r}{x}$

$= \frac{y}{x}$

LS = RS

QED

Trig Identities (6.1) pg296 day 1

ex4: Prove that $\sin^2\theta + \cos^2\theta = 1$

LS = $\sin^2\theta + \cos^2\theta$

$= \left(\frac{y}{r}\right)^2 + \left(\frac{x}{r}\right)^2$

$= \frac{y^2}{r^2} + \frac{x^2}{r^2}$

$= \frac{y^2 + x^2}{r^2}$

$= \frac{r^2}{r^2}$ (Pythag)

$= 1$

RS = 1

LS = RS

QED

Quod est demonstratum

these are the two basic identities

Trig Identities (6.1) p296 day 1

ex5: Prove that $\tan^2 x + 1 = \sec^2 x$ is an identity.

LS = $\tan^2 x + 1$

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

$= \frac{\sin^2 x}{\cos^2 x} + \frac{\cos^2 x}{\cos^2 x}$

$= \frac{\sin^2 x + \cos^2 x}{\cos^2 x}$

$= \frac{1}{\cos^2 x}$

RS = $\sec^2 x$

$= \frac{1}{\cos^2 x}$

LS = RS

QED

4

4. a) $\left(\frac{\cos x}{\tan x}\right)\left(\frac{\tan x}{\sin x}\right)$

$= \frac{\cos x}{\sin x}$

$= \cot x$

b) $\csc \cdot \cot \cdot \sin$

$\left(\frac{1}{\sin}\right)\left(\frac{\cos}{\sin}\right)(\sin)$

$= \csc x$

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

$\cos^2 = 1 - \sin^2$

c) $\frac{\cos x}{1 - \sin^2 x}$

$= \frac{\cos x}{\cos^2 x}$

$= \frac{1}{\cos x} = \sec x$

Trig Identities (6.1) p296 day 1

HW: p296 #4, 10

Assignment due tomorrow

Quiz tomorrow