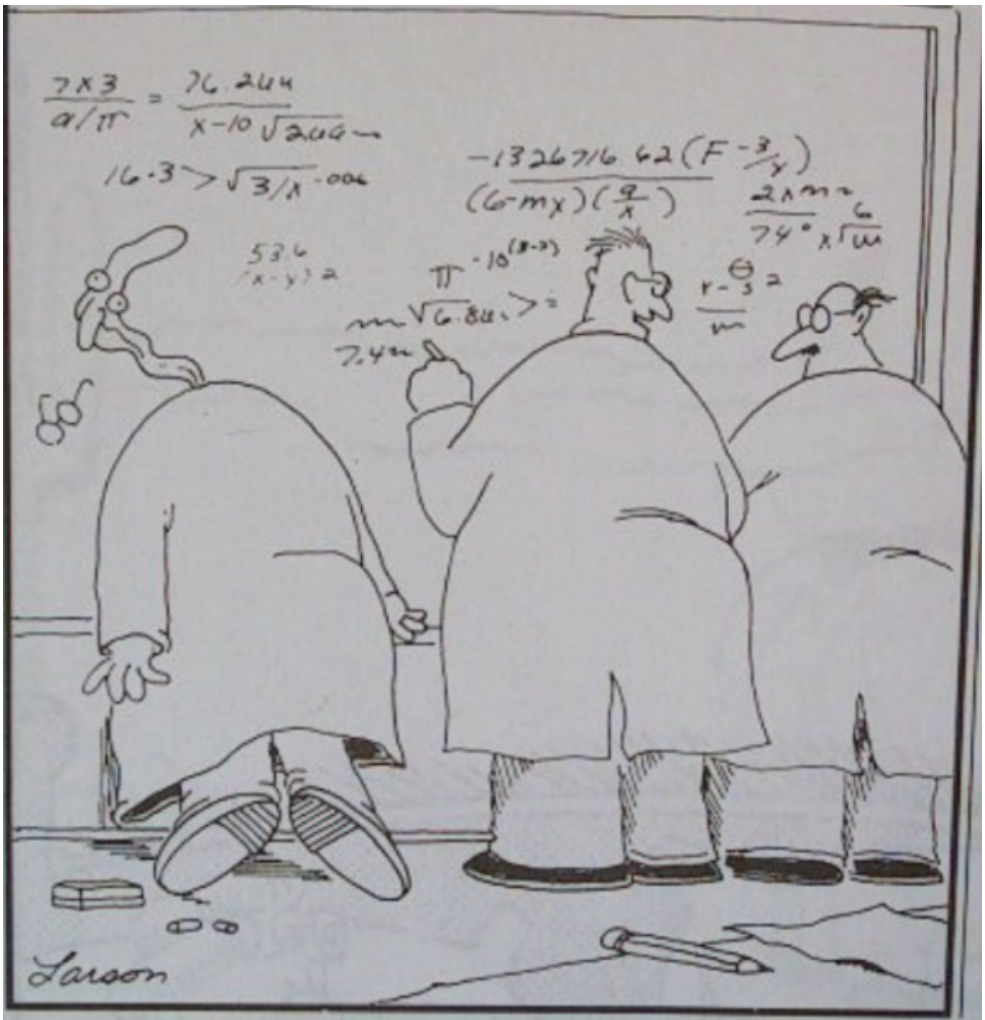
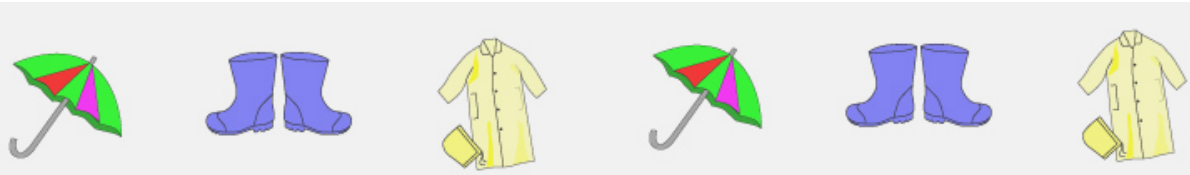
7.1 Using Fundamental Identities



"Ha! Webster's blown his cerebral cortex."



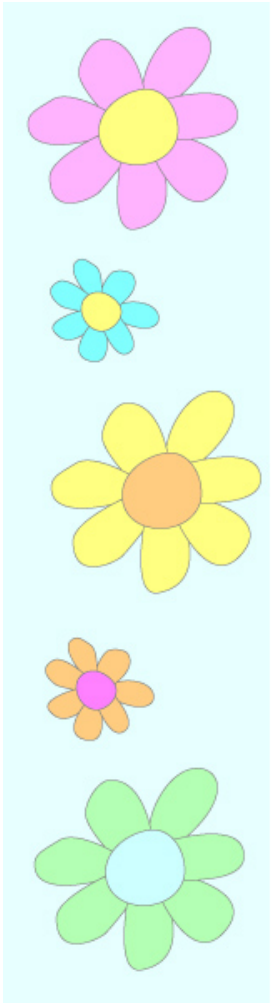
Purposes:

-Evaluate trig functions

-Simplify trig functions

-Solve trig equations

-Verify trig identities



Know your trig identities!!!

Trig Identities.tii

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

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

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

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

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

$1 + \tan^2\theta = \sec^2\theta$

$\tan^2 = \sec^2\theta - 1$

$\tan^2\theta - \sec^2\theta = -1$

$1 - \sec^2\theta = -\tan^2\theta$

$\cot^2\theta + 1 = \csc^2\theta$

$\cot^2\theta = \csc^2\theta - 1$

$\cot^2\theta - \csc^2\theta = -1$

$1 - \csc^2\theta = -\cot^2\theta$

~~$\cos^2\theta$~~

Helpful tips-

- when verifying, work with one side only, usually the more complicated side
- Use algebra skills (factor, foil, etc.)
- Use identities (substitution)
- Try converting everything to sine or cosine
- Try something!!! You will hit dead ends.

Use the given value to evaluate all six trig. functions

$\tan x = \frac{\sqrt{3}}{3}$ $\quad\quad$ $\cos x = -\frac{\sqrt{3}}{2}$

$\cot x = \sqrt{3}$ $\quad\quad$ $\sec x = -\frac{2\sqrt{3}}{3}$

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

$\frac{\sqrt{3}}{3} = \frac{\sin x}{-\frac{\sqrt{3}}{2}}$

$\sin x = -\frac{3}{6} = -\frac{1}{2}$ $\quad\quad$ $\csc x = -2$

Simplify:

$$\sin x \cos^2 x - \sin x$$

$$\sin x(\cos^2 x - 1)$$

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

$$-\sin^3 x$$

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

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

Factor:

$$\csc^2 x - \cot x - 3$$

$$(1 + \cot^2 x) - \cot x - 3$$

$$\cot^2 x - \cot x - 2$$

$$(\cot x - 2)(\cot x + 1)$$

$y^2 = 3$

$x^2 - x - 2$

$(x-2)(x+1)$

Perform the addition and simplify

$$\frac{1-\sin\theta}{\cos\theta}\cdot\frac{(1-\sin\theta)}{(1-\sin\theta)} + \frac{\cos\theta}{1-\sin\theta}\cdot\frac{(\cos\theta)}{(\cos\theta)}$$

$$\frac{1 - 2\sin\theta + \overbrace{\sin^2\theta + \cos^2\theta}^{1}}{\cos\theta\,(1-\sin\theta)}$$

$$\frac{2-2\sin\theta}{\cos\theta\,(1-\sin\theta)}$$

$$\frac{2\cancel{(1-\sin\theta)}}{\cos\theta\cancel{(1-\sin\theta)}} = \frac{2}{\cos\theta}$$

$$2\sec\theta$$

Use fundamental identites to simplify.

$$\frac{\cos^2\theta - 4}{\cos\theta - 2}$$

$$= \frac{(\cos\theta - 2)(\cos\theta + 2)}{\cos\theta - 2}$$

$$= \boxed{\cos\theta + 2}$$

factor:

$$1 + 2\tan^2 x + \tan^4 x$$

$(1 + \tan^2 x)^2$

$(\sec^2 x)^2$

$\sec^4 x$

$1 + 2x^2 + x^4$

$(1 + x^2)^2$

Attachments

Trig Identities.tii

Trig Identities.tii