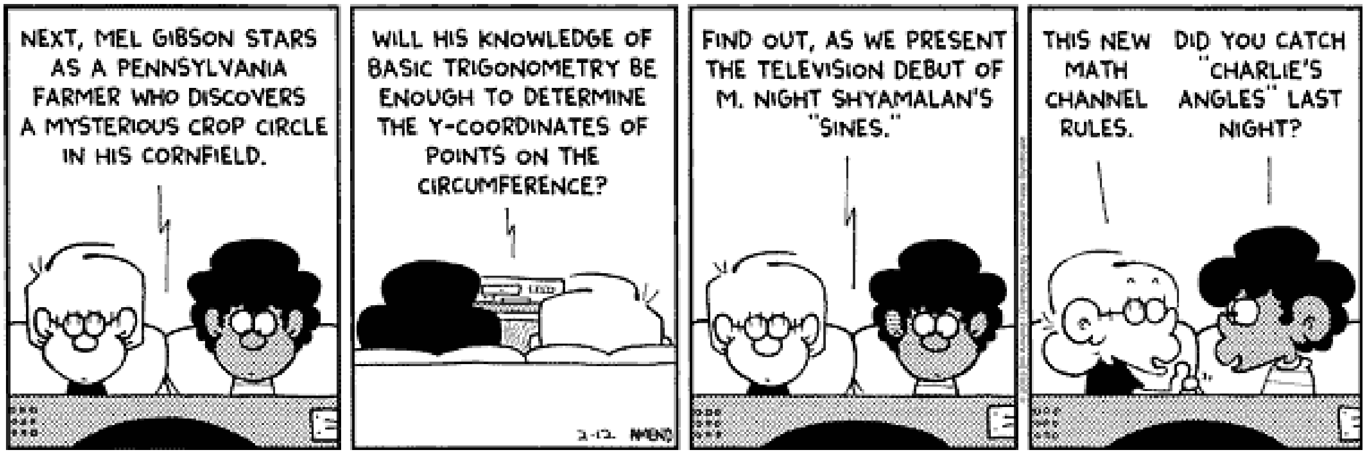
MATH 162 CLASS DISCUSSION

15 JANUARY 2020



A BRIEF LOOK AT TRIG INTEGRALS

1. Integrate each of the following functions of sine x and cosine x:

$(a)\ \sin^2 4x$	$(d)\ (\sin^3 x)\sqrt{1+\cos x}$
$(b)\ \sin^3 x$	$(e)\ \sin^4 3x$
$(c)\ (\sin^2 x)(\cos^9 x)$	$(f)\ \cos^5 x$

2. Integrate each of the following functions of secant x and tangent x:

$(a)\ \sec(4x)$	$(e)\ (\tan x)(\sec^4 x)$
$(b)\ \sec^2 x$	$(f)\ (\tan^9 x)(\sec^2 x)$
$(c)\ \tan^2 x$	$(g)\ (\tan^{10} x)(\sec^4 x)$
$(d)\ (\tan x)(\sec^2 x)$	$(h)\ \sec^3 x$

3. . Using an appropriate trig identity, evaluate each of the following trigonometric integrals:

$(a)\ \int \cos(4x)\sin(8x)\,dx$ $\qquad$ $(b)\ \int \cos(2x)\cos(5x)\,dx$

$(c)\ \int \sin(5x)\sin(9x)\,dx$

4. Find the *average value* of the function

$(a)\quad f(x) = sin^2\, x\ \ cos^3 x\ \ over\ the\ interval\ [-\pi,\pi].$

$(b)\quad f(x) = tan^2\, x\ \ over\ the\ interval\ \left[0,\frac{\pi}{4}\right].$

$(c)\quad f(x) = \sqrt{1+\cos 2x}\ \ over\ the\ interval\ \left[0,\frac{\pi}{6}\right].$ Hint: Use a trig identity.

$(d)\quad f(x) = tan^4\, x\ \ over\ the\ interval\ [0,\pi/4].$

5. Find the area between the curves

(a) $y = \sin^2 x$ and $y = \sin^3 x$ over the interval $[0, \pi]$.

(b) $y = \tan x$ and $y = \tan^2 x$ over the interval $[0, \pi/4]$.

(c)

6. A particle travels on a straight line with velocity function $v(t) = \sin(\omega t)\, cos^2\,(\omega t)$. Find its position function s(t) if f(0) = 0. (This is called an initial-value problem.)

7. Find the indefinite integral of

(a) $sin^2\, x\, cos^2\, x$

(b) $sec^9\, x\, tan^5\, x$

(c) $sec^4\, x\, tan^6\, x$

Trigonometry is a sine of the times.

– author unknown