Key

Pre-Cal. --- Chapter 5 Review

1. Express sin 3x + sin 7x as a product of sines and/or cosines of positive multiples of x.

$2\sin\frac{1}{2}(3x+7x)\cos\frac{1}{2}(3x-7x)$

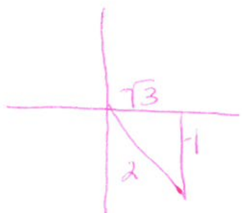
$2\sin\frac{1}{2}(10x)\cos\frac{1}{2}(-4x)$ → $2\sin 5x\cos(-2x)$

$\boxed{2\sin 5x\cos 2x}$

2. Draw a sketch and use it to express $\sqrt{3}\,\boldsymbol{\cos x} - \boldsymbol{\sin x}$ as a single cosine with a phase displacement.

* radians

$\boxed{y = 2\cos(x + 0.5236)}$



$\tan^{-1}\left(\frac{-1}{\sqrt{3}}\right)$

3. Use the result from #2 to solve: $\sqrt{3}\,\boldsymbol{\cos x} - \boldsymbol{\sin x} = \mathbf{1.5}$

$1.5 = 2\cos(x + 0.5236)$

$.75 = \cos(x + 0.53)$

$\pm\cos^{-1}(.75) + 2\pi n = x + 0.53$

$-0.53 \pm .728 + 2\pi n = x$

$\boxed{\begin{array}{l} x = .198 \\ x = -1.258 \end{array}}$

4. Transform this product into a sum: ***y = 2 cos 19x cos x***

$= \cos(19x + x) + \cos(19x - x)$

$\boxed{= \cos 20x + \cos 18x}$

5. Solve $\boxed{\cos 2\theta}$ + cosθ = 1 algebraically for θ ϵ [-100°, 850°]. (Transform cos 2θ so that it involves only cos θ.)

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

$2\cos^2\theta + \cos\theta - 2 = 0$

$\cos\theta = -1.28$

$\cos\theta = .78$

$\theta = \pm\cos^{-1}(.78) + 360°n$

$\theta = \pm 38.74° + 360°n$

$\boxed{\begin{array}{l} 38.74°, 398.74°, 758.74° \\ -38.74, 321.26°, 681.26° \end{array}}$

6. Use the double argument property, cos 2*x* = 1 – 2 sin^2 *x*, to express cos 120° in terms of sin 60°.

$\frac{2x}{2} = \frac{120°}{2}$

$x = 60°$

$\boxed{\cos 120° = 1 - 2\sin^2(60°)}$

7. Use the composite argument property for cosine to transform $\mathbf{y = 4\cos(\theta - 60°)}$ to a linear combination of cos θ and sin θ.

option if it didn't say "use composite arg."

4, 60, 2, $2\sqrt{3} \approx 3.46$

$4\cos 60 = x$

$4\sin 60 = y$

$y = 4(\cos\theta \cos 60 + \sin\theta \sin 60)$

$y = 4(.5\cos\theta + .866\sin\theta)$

$\boxed{y = 2\cos\theta + 3.46\sin\theta}$

8. If $\sin\theta = \frac{-4}{5}$, and $\theta \in [270°, 360°]$, find $\sin 2\theta$ and $\sin\frac{\theta}{2}$.

3, 4, −4, 5, θ

$\sin 2\theta = 2\sin\theta\cos\theta$

$= 2\left(-\frac{4}{5}\right)\left(\frac{3}{5}\right)$

$= \boxed{-\frac{24}{25}}$

$\sin\frac{1}{2}\theta = \pm\sqrt{\frac{1}{2}(1-\cos x)}$

$= \pm\sqrt{\frac{1}{2}\left(1-\frac{3}{5}\right)}$

$= \pm\sqrt{\frac{1}{2}\left(\frac{2}{5}\right)}$

$= \pm\sqrt{\frac{1}{5}}$

$= \pm\frac{1}{\sqrt{5}}$

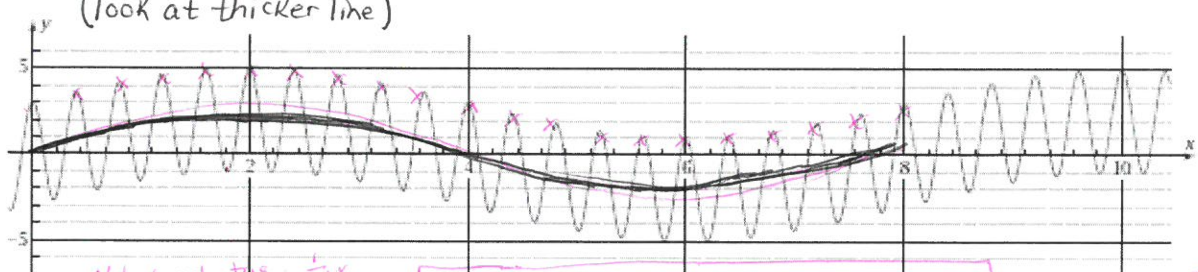
$\boxed{\frac{1}{\sqrt{5}} \text{ or } \frac{\sqrt{5}}{5}}$

$A \Rightarrow 270 - 360$

$\frac{1}{2}A \Rightarrow 135 - 180$ (2^{nd} quad.)

9. Write the equation for the following graphs:

(look at thicker line)



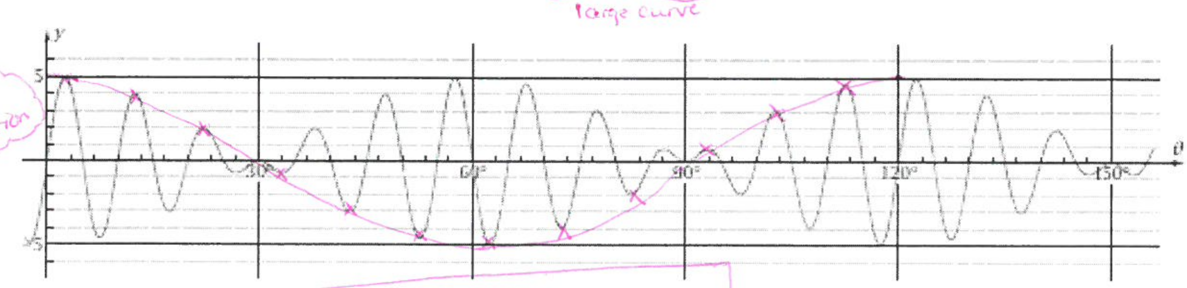
vt + vd trig function hd x

$2\pi * hd = 8 \quad hd = \frac{8}{2\pi}$

$\boxed{y = \underbrace{2\sin\frac{\pi}{4}x}_{\text{large curve}} + 3\cos 5\pi x}$

$20 \cdot \frac{\pi}{4} = \frac{20\pi}{4}$

odd function



$360 * hd = 120$

$hd = \frac{120}{360}$

$\boxed{y = 5\cos 3\theta \cdot \sin 36\theta}$