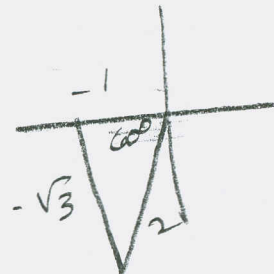


① Spts $(160^\circ) \left(\frac{\pi \text{ rad}}{180^\circ} \right) \approx 2.793 \text{ radians}$

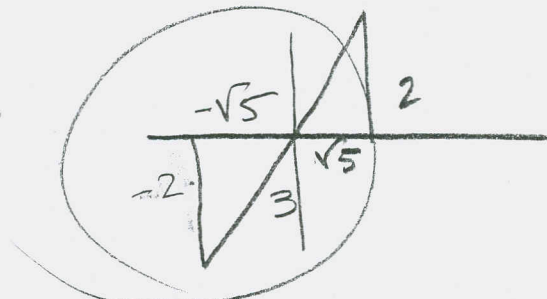
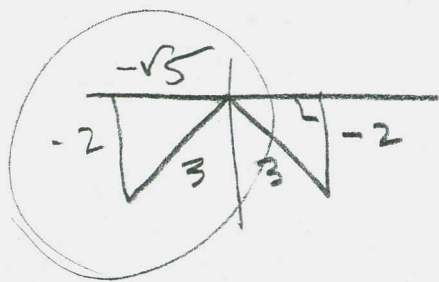
② Spts $\left(\frac{7\pi}{13} \text{ rad} \right) \left(\frac{180^\circ}{\pi \text{ rad}} \right) \approx 9.692^\circ$

③a Spts $\cos\left(\frac{4\pi}{3}\right) = -\frac{1}{2}$



③b Spts $\sin\left(\frac{4\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

④ $\sin x = -\frac{2}{3}$ and $\cot x = \frac{\sqrt{5}}{2}$



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

$$\cos x = +\frac{\sqrt{5}}{2}$$

$$\tan x = \frac{2}{\sqrt{5}}$$

$$\csc x = -\frac{3}{2}$$

$$\sec x = \frac{2}{\sqrt{5}}$$

$$\cot x = \frac{\sqrt{5}}{2}$$

⑤ $T = 3 = \frac{2\pi}{b} \Rightarrow b = \frac{2\pi}{3}$

$$\frac{75-15}{2} = \frac{60}{2} = 30 = a$$

$$\frac{75+15}{2} = \frac{90}{2} = 45 = d$$

High pt of cosine is
to the right $x = 2$ sec :

$$\cos\left(\frac{2\pi}{3}x\right)$$

$$30 \cos\left(\frac{2\pi}{3}x\right)$$

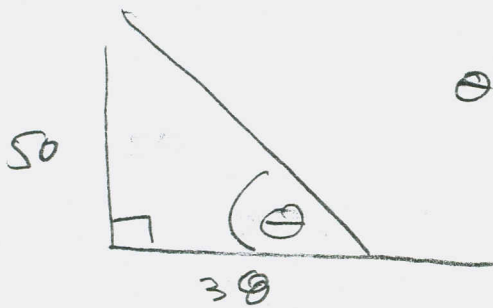
$$30 \cos\left(\frac{2\pi}{3}x\right) + 45$$

② $x = 0$. Move

$$g(x) = 30 \cos\left(\frac{2\pi}{3}(x-2)\right) + 45$$

122 Miktherrn

6

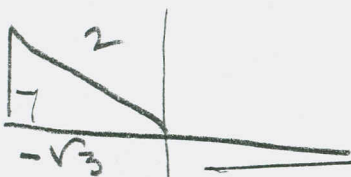


$$\theta = \arctan\left(\frac{50}{38}\right)$$

$$\approx -9209258774 \text{ rad}$$

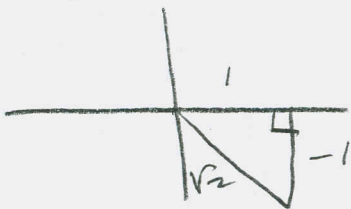
$$\approx 52.76576602^\circ$$

7a $\arccos\left(-\frac{\sqrt{3}}{2}\right)$



$$180^\circ - 30^\circ = 150^\circ \text{ OR } \frac{5\pi}{6} \text{ rad.}$$

7b $\arctan(-1) = -45^\circ \text{ OR } -\frac{\pi}{4} \text{ rad}$



BONUS

$$\frac{4\pi}{3} \text{ corresponds to } \left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$$

BONUS

$$2\sin^2 x - \sin x - 1 = 0$$

$$2u^2 - u - 1 = 0$$

$$(2u + 1)(u - 1)$$

$$x = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2}$$

$$u = -\frac{1}{2} = \sin x$$



$$u = 1 = \sin x$$



122 Midterm

$$\text{BONUS} = \sin(2x) \cos(3x)$$

$$= 2 \sin x \cos x (\cos 2x \cos x - \sin 2x \sin x)$$

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

$$= 2 \sin x \cos x (2 \cos^3 x - 2 \cos x - 2(1 - \cos^2 x) \cos x)$$

$$= 2 \sin x \cos x (2 \cos^3 x - 2 \cos x - 2 \cos x + 2 \cos^3 x)$$

$$= 2 \sin x \cos x (4 \cos^3 x - 4 \cos x)$$

$$= 8 \sin x \cos^4 x - 8 \sin x \cos^2 x$$

$$= 8 \cos^4 x \sin x - 8 \cos^2 x \sin x$$

$$\text{BONUS} \quad x = 6 \sin \theta \Rightarrow \sqrt{36 - x^2} = \sqrt{36 - (6 \sin \theta)^2}$$

$$= \sqrt{36 - 36 \sin^2 \theta} = \sqrt{36(1 - \sin^2 \theta)} = 6 \sqrt{1 - \sin^2 \theta}$$

$$= 6 \sqrt{\cos^2 \theta} = \boxed{6 |\cos \theta|}$$

$$\text{BONUS a} \quad -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2} \Rightarrow 6 |\cos \theta| = 6 \cos \theta$$

b/c $\cos \theta \geq 0$, there.

$$\text{BONUS b} \quad \frac{\pi}{2} \leq \theta \leq \frac{3\pi}{2} \Rightarrow 6 |\cos \theta| = -6 \cos \theta$$

b/c $\cos \theta \leq 0$, there.

122 Midterm

BONUS $s = \text{Arc length}, \theta = 47^\circ, r = 20$

$$s = r\theta = (20)(47^\circ)\left(\frac{\pi \text{ rad}}{180^\circ}\right) \approx \boxed{16.406 \text{ cm}}$$

BONUS $r = 12 \text{ inches}$

$$\underbrace{\left(\frac{3 \text{ rev.}}{1 \text{ sec}}\right)\left(\frac{2\pi \text{ rad}}{1 \text{ rev.}}\right)}_{\theta} \underbrace{(12 \text{ inches})}_r \left(\frac{1 \text{ ft}}{12 \text{ inches}}\right)$$

$$\approx \boxed{18.850 \frac{\text{ft}}{\text{sec}}}$$

BONUS $r = 8, \theta = 40^\circ = (40^\circ)\left(\frac{\pi \text{ rad}}{180^\circ}\right)$

$$A = \frac{1}{2} r^2 \theta$$

$$= \frac{1}{2} (8)^2 \left(\frac{40\pi}{180}\right) \approx \boxed{22.340 \text{ in}^2}$$