# 1-4 Mon

## Sem 2 Review

1) a) $s = r\theta$ $\theta$ in radians

$\theta = \frac{19}{4.2} \approx 4.52$ rad. $\times \frac{180}{\pi} = 259.195°$

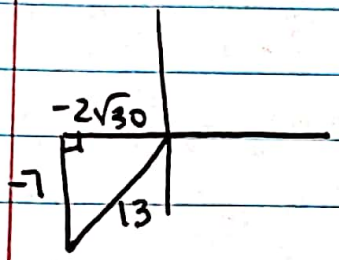
b) $s = 4.2\left(5\pi/9\right) = 7.33$ m

c) 2.5 radius lengths along the circular path

d) $\theta = \frac{3.2}{4.2} \approx 0.7619\ldots$

$\theta = \frac{8.3}{4.2} \approx 1.976\ldots$ $\left(\frac{8.3}{4.2}\right) - \left(\frac{3.2}{4.2}\right) = 1.214$ rad.

2)




$x^2 + (-7)^2 = 13^2$

$x^2 + 49 = 169$

$\sqrt{x^2} = \sqrt{120}$

$x = 2\sqrt{30}$

$\cos\theta = \frac{-2\sqrt{30}}{13}$ $\sec\theta = \frac{-13}{2\sqrt{30}}$

$\sin\theta = \frac{-7}{13}$ $\csc\theta = -\frac{13}{7}$

$\tan\theta = \frac{7}{2\sqrt{30}}$ $\cot\theta = \frac{2\sqrt{30}}{7}$

3) a) $\theta = \frac{s}{r} = \frac{14.5}{4} = 3.625$ rad $\times \frac{180}{\pi} = 207.697°$

b) $\theta = \frac{20.2}{4} = 5.05$ rad $\times \frac{180}{\pi} = 289.344°$

4) a) Ph. shift none vertical shift 2

$f(x) = \cos(x) + 2$

Period of $2\pi$

these are Approximations

b) ph shift 0.8 v.s. $-1$ Per $\approx 6$

$f(x) = \cos\frac{\pi}{3}(x - 0.8) - 1$

Period of 6

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#5-8 Tues

5) $f(x) = 2\sin(3x) - 4$

a. vertical stretch by factor of 2
Amplitude ($\frac{1}{2}$ vertical dist from max to min) = 2

b. 3 full cycles from 0 to $2\pi$
horizontal shrink by factor of $\frac{1}{3}$
Period = $2\pi/3$ or $\frac{1}{3}(2\pi)$

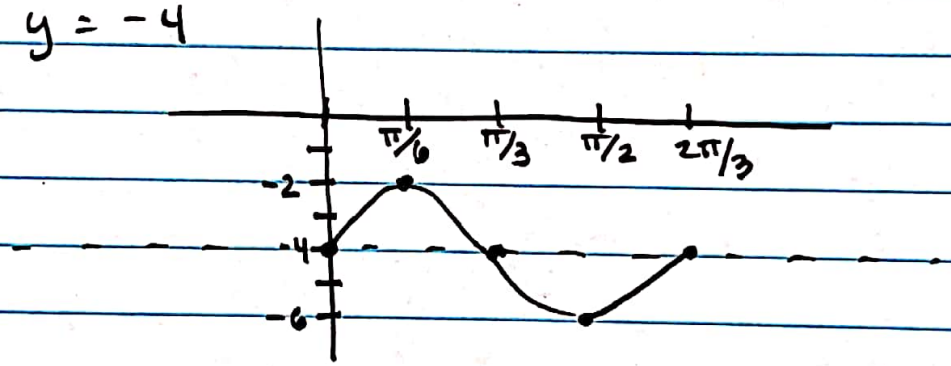
c. $-4$ is vertical shift down 4. Midline is $-4$

d. $P = 2\pi/3$

e. $A = 2$

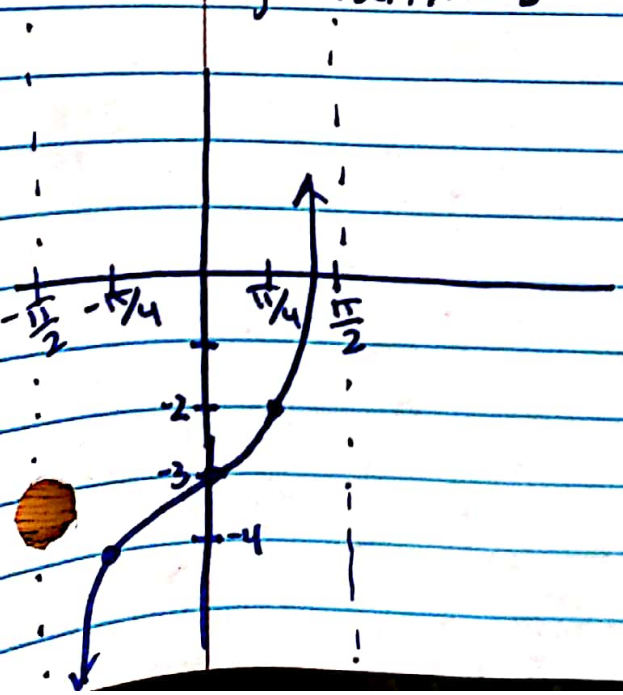
f. $y = -4$

g.




6) $y = \tan x - 3$

- vertical shift down 3
- VA. $x = -\frac{\pi}{2}$, $x = \frac{\pi}{2}$, $x = \frac{3\pi}{2}$
- period = $\pi$ 2 periods from $-\frac{\pi}{2} \to \frac{3\pi}{2}$
- points $(-\frac{\pi}{4}, -4)$ $(0, -3)$ $(\frac{\pi}{4}, -2)$ $(\frac{3\pi}{4}, -4)$ $(\pi, -3)$ $(\frac{5\pi}{4}, -2)$

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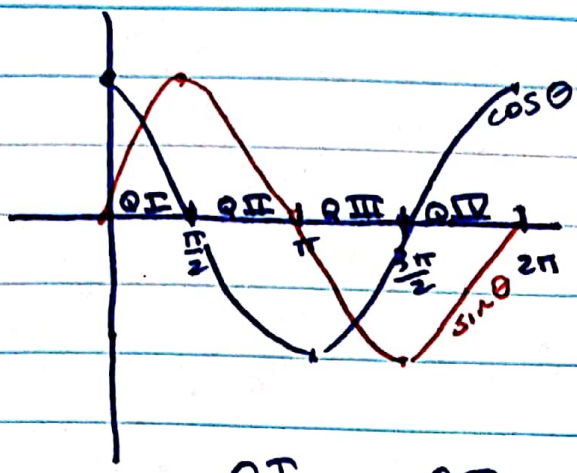
# 9-16 Wed/Thurs

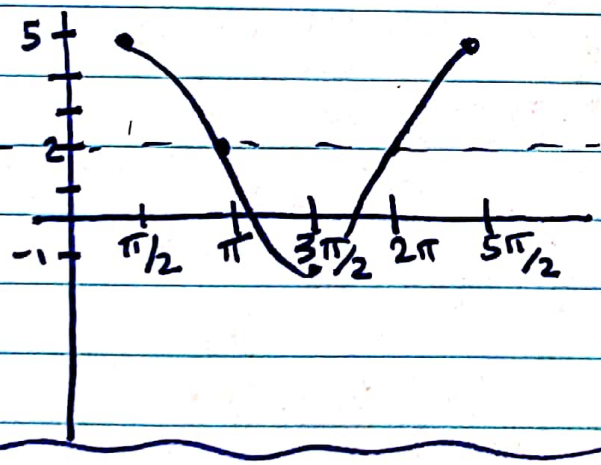
7)




| | QI | QII | QIII | QIV |
|---|---|---|---|---|
| sinθ | Incr. | Decr. | Decr. | Incr. |
| cosθ | Decr. | Decr. | Incr. | Incr. |

8) $y = 3\cos(x - \frac{\pi}{2}) + 2$

Amp. = 3 Per = $2\pi$ P/S $\frac{\pi}{2}$ V.S. 2 Right Endpt $\frac{5\pi}{2}$




$(\frac{\pi}{2}, 5)$ $(\pi, 2)$ $(\frac{3\pi}{2}, -1)$ $(2\pi, 2)$ $(\frac{5\pi}{2}, 5)$

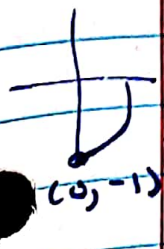
9) $\arcsin(-1) = \frac{-\pi}{2}$

10) $\cos^{-1}(1) = 0$

11) $\tan^{-1}(\tan\frac{11\pi}{6})$

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

$\theta = -\frac{\pi}{6}$




12) a) $\arcsin(-\frac{1}{2})$ $\theta = \frac{-\pi}{6}$

b) $\sin^{-1}(\frac{\sqrt{3}}{2})$ $\theta = \frac{\pi}{3}$

c) $\sin^{-1}(2)$ DNE

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#17-31

End of Block Wed/Thurs

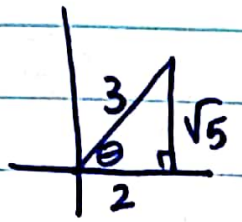
13) a) $\arccos\left(\frac{\sqrt{2}}{2}\right)$ $\theta = \frac{\pi}{4}$

b) $\arctan(0)$ $\theta = 0$

c) $\tan^{-1}(-1)$ $\theta = -\frac{\pi}{4}$

14) a) $\tan\left(\arccos\frac{2}{3}\right)$

$\cos\theta = \frac{2}{3}$

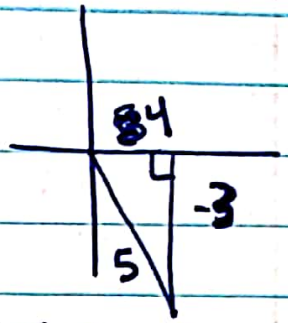



$4+y^2 = 9$

$y = \sqrt{5}$

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

b) $\cos\left[\arcsin\left(-\frac{3}{5}\right)\right]$




$\cos\theta = \frac{4}{5}$

15) $\cos^{-1}\left(\sin\frac{5\pi}{6}\right)$

$\cos^{-1}\left(\frac{1}{2}\right)$

$\theta = \frac{\pi}{3}$

16) $\sin^{-1}\left(\cos\frac{5\pi}{6}\right)$

$\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

$\theta = -\frac{\pi}{3}$

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17) $\frac{\sin x \cdot \cos x}{\sin x} = 1$

$\cos x = 1$

18) $\sin x \cdot \frac{1}{\cos x} = 3$

$\frac{\sin x}{\cos x} = 3$

$\tan x = 3$

$\cot x = \frac{1}{3}$

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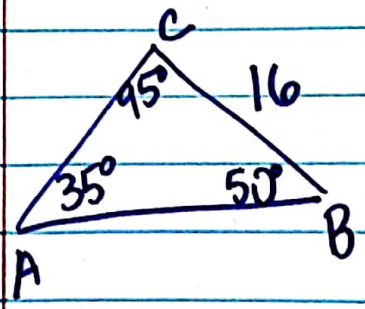
19.)



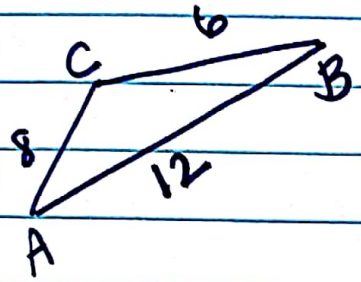

$m\angle C = 95$

$$\frac{16}{\sin 35} = \frac{b}{\sin 50} \qquad \frac{16}{\sin 35} = \frac{c}{\sin 95}$$

$$b = \frac{16\sin(50)}{\sin(35)} \qquad c = \frac{16\sin(95)}{\sin(35)}$$

$b = 21.37$ | $c = 27.79$

20.)




$$\cos C = \frac{(6^2 + 8^2 - 12^2)}{(2(6)(8))}$$

$$C = \cos^{-1}\left(\frac{-44}{96}\right)$$

$C = 117.28°$

$$\cos B = \frac{(6^2 + 12^2 - 8^2)}{(2(6)(12))}$$

$$B = \cos^{-1}\frac{116}{144}$$

$B = 36.33°$

$A = 180 - (117.28 + 36.33)$

$A = 26.38°$
$B = 36.33°$
$C = 117.28°$

21) a) $\cos(75°) = \cos(30° + 45°)$

$\cos 30 \cos 45 - \sin 30 \sin 45$

$\frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{1}{2} \cdot \frac{\sqrt{2}}{2}$

$\frac{\sqrt{6} - \sqrt{2}}{4}$

[redacted]

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21) b) $\sin(75°) = \sin(45° + 30°)$

$= \sin 45 \cos 30 + \cos 45 \sin 30$

$\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2}$

$\frac{\sqrt{6} + \sqrt{2}}{4}$

c) $\tan 75 = \tan(45 + 30)$

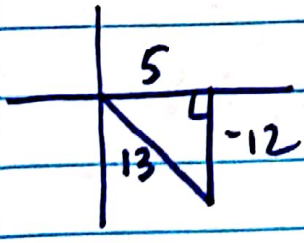
$\frac{\tan 45 + \tan 30}{1 - \tan 45 \cdot \tan 30}$

$\frac{\left(1 + \frac{\sqrt{3}}{3}\right)\left(1 + \frac{\sqrt{3}}{3}\right)}{\left(1 - \frac{\sqrt{3}}{3}\right)\left(1 + \frac{\sqrt{3}}{3}\right)} = \frac{\frac{4}{3} + \frac{2\sqrt{3}}{3}}{1 - \frac{1}{3} = \frac{2}{3}}$

$\frac{4 + 2\sqrt{3}}{3} \cdot \frac{3}{2}$

$= 2 + \sqrt{3}$

22) $\cos\theta = \frac{5}{13}$ $\frac{3\pi}{2} < \theta < 2\pi$ QIV




$\tan 2\theta = \frac{2\left(-\frac{12}{5}\right)}{1 - \left(-\frac{12}{5}\right)^2} = \frac{-\frac{24}{5}}{-\frac{119}{25}} = \boxed{\frac{120}{119}}$

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

$2\left(\frac{-12}{13}\right)\left(\frac{5}{13}\right) = \boxed{\frac{-120}{169}}$

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

$\left(\frac{5}{13}\right)^2 - \left(\frac{-12}{13}\right)^2$

$\frac{25}{169} - \frac{144}{169} = \boxed{\frac{-119}{169}}$

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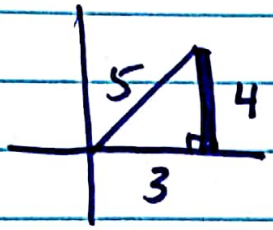
23) $\cos\theta = 0.6 = \frac{6}{10} = \frac{3}{5}$ $\quad 0° < \theta < 90°$




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

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

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

24) a) $\sin 42 \cos 17 - \cos 42 \sin 17$ ($\alpha$ = 42, $\beta$ = 17)

$\sin(42° - 17°) = \boxed{\sin 25°}$

formula given on final: $\sin(u - v)$

b) $\cos 94 \cos 18 + \sin 94 \sin 18$ ($u$ = 94, $v$ = 18)

$\cos(94° - 18°)$

$\boxed{\cos 76°}$

formula given on final: $\cos(u - v)$

25) $2\cos^2 x - 5\cos x + 2 = 0$ $\quad [0, 2\pi)$

$(2\cos x - 1)(\cos x - 2) = 0$

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

no soln

$\boxed{\frac{\pi}{3}, \frac{5\pi}{3}}$

26) $2\sin^2 x - \sin x - 1 = 0$ $\quad$ all solns.

$(2\sin x + 1)(\sin x - 1) = 0$

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

$x = \frac{7\pi}{6} + 2\pi n, \frac{11\pi}{6} + 2\pi n$ $\quad \frac{\pi}{2} + 2\pi n$

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27) $2\sin^2 x - 3\sin x + 1 = 0$ all solns

$(2\sin x - 1)(\sin x - 1) = 0$

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

$\frac{\pi}{6} + 2\pi n$ $\frac{\pi}{2} + 2\pi n$

$\frac{5\pi}{6} + 2\pi n$

28) $\frac{\sin\theta}{\tan\theta}$

$\sin\theta \cdot \frac{\cos\theta}{\sin\theta}$

$\boxed{\cos\theta}$

29) $\sec^2\theta - \tan^2\theta$

$\frac{1}{\cos^2\theta} - \frac{\sin^2\theta}{\cos^2\theta}$

$\frac{1-\sin^2\theta}{\cos^2\theta}$

$\frac{\cos^2\theta}{\cos^2\theta} = \boxed{1}$

30) $\cos\theta(\tan^2\theta + 1)$

$\frac{1}{\sec\theta} \cdot \sec^2\theta$

$\boxed{\sec\theta}$

31) $\frac{1-\sin^2\theta}{1-\cos^2\theta} = \frac{\cos^2\theta}{\sin^2\theta}$

$\boxed{\cot^2\theta}$

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end of class

#32-35 Fri

32) $r^2 = 3r\cos\theta$

$x^2+y^2 = 3x$

$\boxed{x^2+y^2-3x=0}$

Answer ok like this for the final ☺

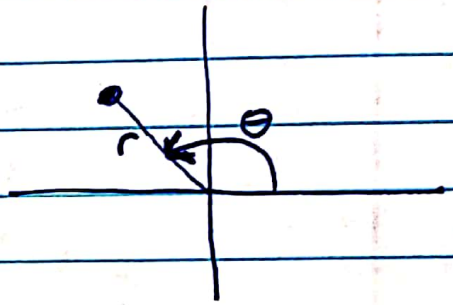
33) $(-3\sqrt{3}, 3)$

$r = \sqrt{(-3\sqrt{3})^2 + 3^2}$

$9 \cdot 3$

$\sqrt{27+9}$

$\sqrt{36} = 6$




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

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

$\theta = \frac{5\pi}{6}$

$\boxed{\left(6, \frac{5\pi}{6}\right)}$

34) $5\left(\frac{\sqrt{2}}{2} + i\frac{\sqrt{2}}{2}\right) = \boxed{\frac{5\sqrt{2}}{2} + \frac{5\sqrt{2}}{2}i}$

35) $(1-\sqrt{3}i)^3$

$z = r(\cos\theta + i\sin\theta)$

$z^3 = r^3(\cos 3\theta + i\sin 3\theta)$

$= 2^3\left(\cos\left(-\frac{3\pi}{3}\right) + i\sin\left(-\frac{3\pi}{3}\right)\right)$

$= 8(\cos(-\pi) + i\sin(-\pi))$

$= 8(-1 + i(0))$

$= \boxed{-8}$

$r = \sqrt{1^2+(-\sqrt{3})^2} = \sqrt{1+3}$

$\sqrt{4} = 2$

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

$\theta = -\frac{\pi}{3}$

(-1, 0)

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