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MEMO

1a) $y = -x + 2$

b) $\theta = 135^\circ$ $\tan \theta = -1$

c) $(\frac{3}{2}, \frac{5}{2})$

$\frac{0+x}{2} = \frac{3}{2}$ $\frac{2+y}{2} = \frac{5}{2}$

$x = 3$ $y = 3$

$\therefore O(3;3)$

d) $(x-c)^2 + (y-z)^2 = r^2$

$4 + 4 = r^2$ $(2;4)$

$\therefore x^2 + (y-2)^2 = 8$

e) $m = 1$

$m \text{ tangent} = -1$

$y - 4 = -1(x - 2)$

$y = -x + 6$

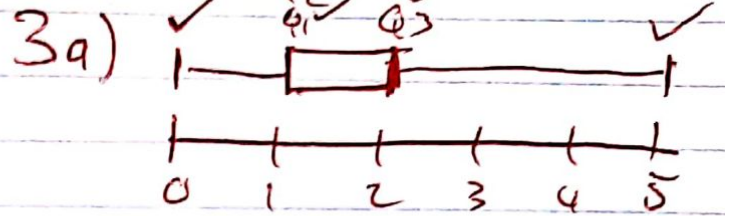
2a) $r = 0,847$
Strong positive

b) $y = 209,551 + 94,72x$

c) $y = 209,551 + 94,72(13)$

$y = 1442,21$

d) reliable, interpolation



b) Australia was the better team

Middle 50% for Aus lies between 1 and 3

and middle 50% for NZ lies between 1 and 2

25% of Aus above 3 whereas 25% of NZ above 2

4a)

$< 18,5$	0%
18,5 - 25	10%
25 - 30	88%
30 >	2%

b) 50% percentile 28
median

c) 75% percentile

d) 25% of 185
 $\therefore 46$

5a) $a = 50^\circ$ Lin semi C

b) $b = 70^\circ$ Ext. $\angle \Delta$

c) $c = 140^\circ$ Opp $\angle$ s cyclical

d) $d = 70^\circ$ rad $\perp$ tang

e) $e = 70^\circ$ tan chord th.

6) $O_1 = x - 10^\circ$ L at centre = $2L$ circum.
 $x - 10 + 4x = 360^\circ$ revolution $\checkmark$
 $5x = 370^\circ$
 $x = 74^\circ \checkmark$

$\hat{O} = 180^\circ - (2 \times 74 - 20)$
 $= 180 - 128$
 $= 52^\circ$

$y = 26^\circ \checkmark$ opp is cyclic quad $\checkmark$

7) $\cos \theta = 0 \checkmark$
 $2\cos 2\theta + 1 = 0$
 $\theta = 90^\circ + k \cdot 360^\circ$
 $\theta = 270^\circ + k \cdot 360^\circ$
 $\cos 2\theta = -\frac{1}{2} \checkmark$

$2\theta = 120^\circ + k \cdot 360^\circ \checkmark$
 $\theta = 60^\circ + k \cdot 180^\circ \checkmark$

$2\theta = 240^\circ + k \cdot 360^\circ \checkmark$
 $\theta = 120^\circ + k \cdot 180^\circ \checkmark$

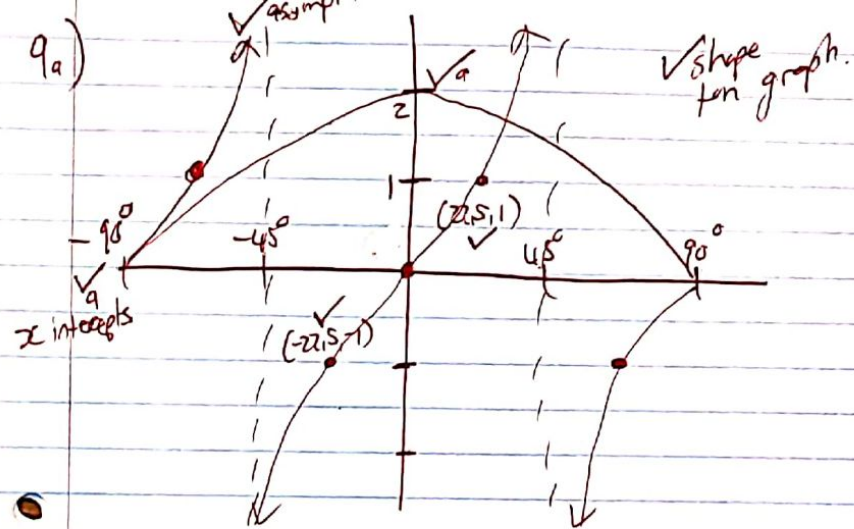
8) $LHS = \frac{\cos x - (2\cos^2 x - 1) + 2}{3\sin x - 2\sin x \cdot \cos x} \checkmark$

$= \frac{-2\cos^2 x + \cos x + 3}{\sin x (3 - 2\cos x)} \checkmark$

$= \frac{-(2\cos^2 x - \cos x - 3)}{\sin x (2\cos x - 3)} \checkmark$

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

$= RHS$



b) $2\cos x = \tan 2x$
 $2\cos x = \frac{\sin 2x}{\cos 2x} \checkmark$

$\cos 2x \cdot 2\cos x = \sin 2x \checkmark$
 $\cos 2x \cdot 2\cos x - 2\sin x \cdot \cos x = 0$
 $2\cos x (\cos 2x - \sin x) = 0$

c) $2\cos x = 0$
 $x = 90^\circ \checkmark$

$1 - 2\sin^2 x - \sin x = 0$
 $2\sin^2 x + \sin x - 1 = 0$
 $(2\sin x - 1)(\sin x + 1) = 0$
 $\sin x = \frac{1}{2} \checkmark$
 $x = 30^\circ \checkmark$ or $x = -90^\circ$

d) $x \in (-90^\circ; -45^\circ) \checkmark$
 or
 $x \in (0^\circ; 45^\circ) \checkmark$

$\checkmark$ brackets.

10a) $M(3i)$ $r=2$

b) $\hat{P} = 90^\circ$ rad $\perp$ tang $\checkmark_a$

$Am^2 = AP^2 + mp^2$ pathing $\checkmark_m$

$(t-3)^2 + 6^2 = (2\sqrt{13})^2 + 4 \checkmark_a$

$(t-3)^2 = 52 + 4 - 36 \checkmark_{ca}$

$(t-3)^2 = 20 \checkmark_{ca}$

$t-3 = \sqrt{20} \checkmark_{ca}$

$t = \sqrt{20} + 3 \checkmark_{ca}$

11a) $x^2 + 16x + 64 + y^2 - 4y + 4 = -65 + 64 + 4$
 $(x+8)^2 + (y-2)^2 = 3$

$\therefore A(-8; 2) \checkmark_{ca} \quad r = \sqrt{3} \checkmark_{ca}$

b) $B(-5; \frac{1}{2}) \checkmark_a$

$\therefore C(-2; 2) \checkmark_a$

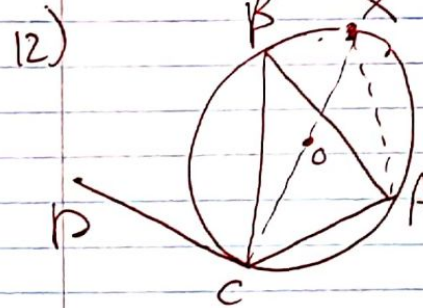
$(x+2)^2 + (y-2)^2 = 3 \checkmark_{ca}$

c) $AB = \sqrt{9 + \frac{9}{4}} \checkmark_m$
 $= \sqrt{\frac{45}{4}} \checkmark_a$

$\therefore \sqrt{\frac{45}{4}} < 6 \checkmark_{ca}$

$\therefore$ intersect twice $\checkmark_a$

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12)

Construct: XC and XA $\checkmark_a \checkmark_a$

RTP: $\hat{PCB} = \hat{CAB}$

Proof: $\angle OCD = 90^\circ$ tan $\perp$ rad $\checkmark_a$
 $\angle XAC = 90^\circ$ L in semi $\checkmark_a$

but $\hat{XAB} = \hat{BCX}$ (L in same segment $\checkmark_a$)
 and $\hat{XAB} + \hat{BAC} = \hat{BCX} + \hat{BCD} \checkmark_{ca}$
 $\therefore \hat{BCD} = \hat{CAB}$

13a) $\hat{B}_2 = x$ (tan chord th)
 $\hat{C}_2 = x$ (tan chord)
 $\hat{T}_1 = x$ (alt Ls || lines)
 $\hat{A}_3 = x$ (L in same segment)
 $\hat{T}_4 = x$ (vert. opp Ls) } any 4 for 4 marks

b) $\hat{T}_4 = \hat{A}_1$ proved above $\checkmark$
 $\therefore$ TP is tangent to ADT (converse tan chord) $\checkmark$

c) $\hat{P} = \hat{P}$ $\checkmark$ common
 $\hat{A}_1 = \hat{T}_4$ proved $\checkmark$
 $\hat{T}_3 + \hat{T}_4 = \hat{D}_2$ int Ls of Δ
 $\therefore \Delta PAT \parallel \Delta PTD$ LLL $\checkmark$

$$d) \frac{PA}{PT} = \frac{AT}{TD} = \frac{PT}{PD} \quad (\text{III } \Delta S) \checkmark$$

$$\therefore \cancel{AT} PT^2 = AP \cdot PD \checkmark$$

$$\text{but } AD = \frac{2}{3} AP$$

$$\frac{AD}{AP} = \frac{2}{3}$$

$$\therefore \frac{AD}{AP} = \frac{2}{3} \checkmark$$

$$\therefore AD = 2DP$$

$$\therefore PA = 3DP$$

$$DP = \frac{PA}{3} \checkmark$$

$$\therefore PA \left(\frac{PA}{3} \right) = PT^2$$

$$PA^2 = 3PT^2$$

$$14a) \frac{CE}{ED} = \frac{CT}{TA} = \frac{1}{2} \checkmark \text{ prop. int. th.}$$

$$b) DC = 15$$

$$\frac{CE}{CD} = \frac{1}{3} \checkmark$$

$$\therefore CE = \frac{1}{3} \times 15 \checkmark$$

$$= 5$$

$$\therefore DE = 10 = BP$$

$\therefore D$ is midpt.

$$c) FD = 2.5$$

$$FD \parallel TE \text{ (given)} \checkmark$$

$$D \text{ is midpt. proves}$$

$$\therefore TE = 5 \text{ (convers. midpt. th.)}$$

$$d) \frac{\frac{1}{2} \times OC \times h}{\frac{1}{2} \times BD \times h} \checkmark$$

$$14e) \frac{\frac{1}{2} \cdot TC \cdot CE \cdot \sin \angle C}{\frac{1}{2} \cdot AC \cdot BC \cdot \sin \angle C} \checkmark$$

$$= \frac{TC \cdot CE}{AC \cdot BC} \checkmark$$

$$= \frac{1 \cdot 5}{3 \cdot 12}$$

$$= \frac{5}{36} \checkmark$$

$$15a) \frac{PS}{10} = \sin 45^\circ \checkmark$$

$$PS = \frac{10\sqrt{2}}{2} = 5\sqrt{2} \checkmark$$

$$QR = 2SR$$

$$\frac{SR}{10} = \cos 45^\circ \checkmark$$

$$SR = 5\sqrt{2} \checkmark$$

$$\therefore QR = 10\sqrt{2}$$

$$QR^2 = 10^2 + 10^2 \checkmark$$

$$QR = 10\sqrt{2} \checkmark$$

$$QS = 5\sqrt{2} \checkmark$$

(prop. of Δ)

$$\therefore PS = \sqrt{10^2 - (5\sqrt{2})^2}$$

$$= 5\sqrt{2} \checkmark$$

$$b) \frac{QR}{\sin \theta} = \frac{SQ}{\sin \left(\frac{180^\circ}{2} - \frac{\theta}{2} \right)} \checkmark$$

$$QR = \frac{5\sqrt{2} \cdot \sin \theta}{\sin \left(90^\circ - \frac{\theta}{2} \right)} \checkmark$$

$$= \frac{5\sqrt{2} \cdot \sin 2 \left(\frac{\theta}{2} \right)}{\cos \frac{\theta}{2} \checkmark}$$

$$= \frac{10\sqrt{2} \cdot \sin \frac{\theta}{2} \cdot \cos \frac{\theta}{2} \checkmark}{\cos \frac{\theta}{2}}$$

c) Let Pt of intersection of hand QP be T:

$$PT^2 = PQ^2 - QT^2 \quad \sqrt{m}$$

$$= 100 - \left(5\sqrt{2} \cdot \sin \frac{\theta}{2}\right)^2$$

$$= 100 - 50 \sin^2 \frac{\theta}{2}$$

$$= 100 - 50 \left(1 - \cos^2 \frac{\theta}{2}\right) \quad \sqrt{q}$$

$$PT^2 = 50 \left(2 - 1 + \cos^2 \frac{\theta}{2}\right) \quad \sqrt{ca}$$

$$PT = 5\sqrt{2} \sqrt{1 + \cos^2 \frac{\theta}{2}} \quad \sqrt{ca}$$

$$LHS = 5\sqrt{\cos \theta + 3}$$

$$= 5\sqrt{2\cos^2 \frac{\theta}{2} - 1 + 3} \quad \sqrt{ca}$$

$$= 5\sqrt{2\cos^2 \frac{\theta}{2} + 2} \quad \sqrt{ca}$$

$$= 5\sqrt{2} \sqrt{\cos^2 \frac{\theta}{2} + 1}$$