Pg. 73 No. 13

$$\sqrt{x^2+7x-7} - \sqrt{x^2+3x} = 1$$

$$\sqrt{x^2+7x-7} = 1 + \sqrt{x^2+3x}$$

$$x^2+7x-7 = 1 + 2\sqrt{x^2+3x} + x^2+3x$$

$$4x-8 = 2\sqrt{x^2+3x}$$

$$2x-4 = \sqrt{x^2+3x}$$

$$4x^2-16x+16 = x^2+3x$$

$$3x^2-19x+16 = 0$$

$$3x^2-19x = -16$$

$$x^2-\frac{19}{3}x = -\frac{16}{3}$$

$$x^2-\frac{19x}{3} - \left(\frac{19}{6}\right)^2 = -\frac{16}{3} - \left(\frac{19}{6}\right)^2$$

$$x^2-\frac{19x}{3} + \frac{361}{36} = -\frac{16}{3} - \frac{361}{36} = -\frac{192}{36} - \frac{361}{36} = -\frac{553}{36}$$

$$\frac{x - 19}{6} = \pm\sqrt{\frac{553}{36}}$$

$$x = \pm\sqrt{\frac{553}{36}} + \frac{19}{6} = \pm\frac{\sqrt{553}}{6} + \frac{19}{6} = \pm\frac{\sqrt{553}+19}{6}$$

$$= \pm\sqrt{15.36} + 3.17 = \pm 3.92 + 3.17$$

$$= 7.09 \text{ or } -.75$$

Check $\sqrt{49.63+49.63-7} - \sqrt{49.63+21.27} = 1$

$$\sqrt{92.26} - \sqrt{70.90} = 1$$

$$9.60 - 8.42 = 1$$

or

$$\sqrt{.5625 - 5.25 - 7} - \sqrt{.5625 - 2.25} = 1$$

$$\sqrt{11.6875} - \sqrt{-1.6875} = 1$$

?

Pg. 74 No. 2

$$9x^{-4} - 37x^{-2} + 4 = 0$$

$$\frac{9}{x^4} - \frac{37}{x^2} + 4 = 0$$

$$9 - 37x^2 + 4x^4 = 0$$

$$4x^4 - 37x^2 = -9$$

$$x^4 - \frac{37x^2}{4} = -\frac{9}{4}$$

$$x^4 - \frac{37x^2}{4} + \left(\frac{37}{8}\right)^2 = -\frac{9}{4} + \left(\frac{37}{8}\right)^2$$

$$\left(x^2 - \frac{37}{8}\right)^2 = -\frac{9}{4} + \frac{1369}{64}$$

$$= -\frac{144}{64} + \frac{1369}{64} = + \frac{\cancel{1513}\ 1225}{64}$$

How about your minus sign

$$x^2 - \frac{37}{8} = \sqrt{\frac{1513}{64}} = \frac{\sqrt{1513}}{8}$$

$$x^2 = \frac{\sqrt{1513} + 37}{8} = \frac{38.85 + 37}{8}$$

$$= 9.475$$

$$x = 3.08$$

Check

$$9 - 37x^2 + 4x^4 = 0$$

$$9 - 333 + 324 = 0$$

$x^2 - \frac{37}{8} = \frac{35}{8}$, $x^2 = 9$, $x = 3, -3$

or $x^2 - \frac{37}{8} = -\frac{35}{8}$, $x^2 = 1/4$, $x = 1/2, -1/2$

Pg. 89 No. 9

$$3x^2 + 2y^2 = 11$$
$$3x^2 - 4y = 11$$

$$2y^2 + 4y = 0$$

$$y^2 + 2y = 0$$

$$y + 2 = 0$$

$$y = -2$$

Then $3x^2 + 8 = 11$

$$3x^2 = 3$$

$$x = 1$$

Page 98 No. 5

Express as logarithm of single quantity

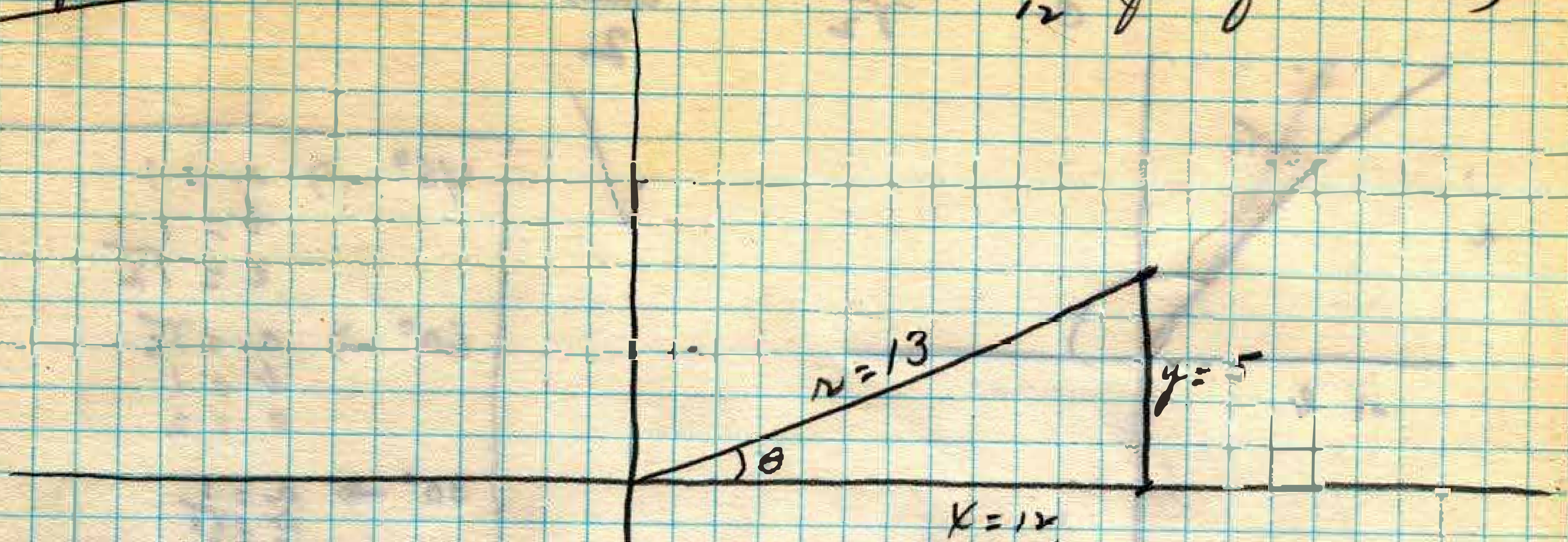
$$2\log_7 76 + 3\log_7 48 - 5\log_7 59$$

$$= \log_7 76^2 + \log_7 48^3 - \log_7 59^5$$

$$= \log_7 \frac{(76^2 \cdot 48^3)}{59^5}$$

Page 117 No. 1

$\tan \theta = \frac{5}{12}$ (first quadrant)



$\sin \theta = 5/13$

$\cos \theta = 12/13$

$\tan \theta = \frac{5}{12}$

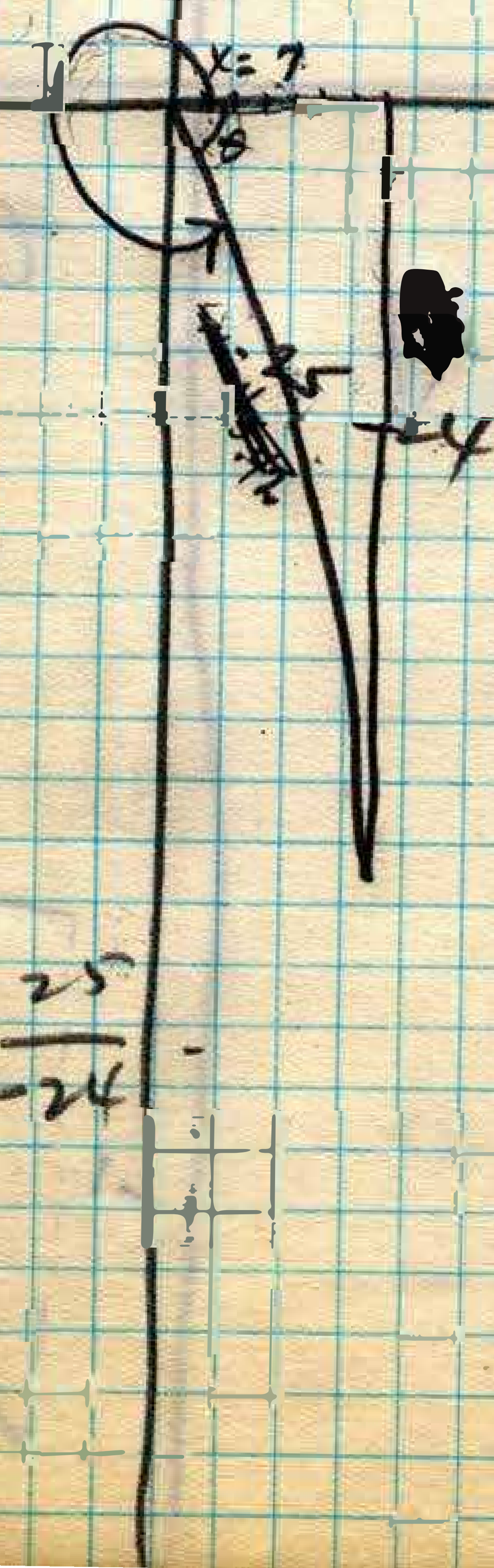
$\cot \theta = 12/5$

$\sec \theta = 13/12$

$\operatorname{cosec} \theta = 13/5$

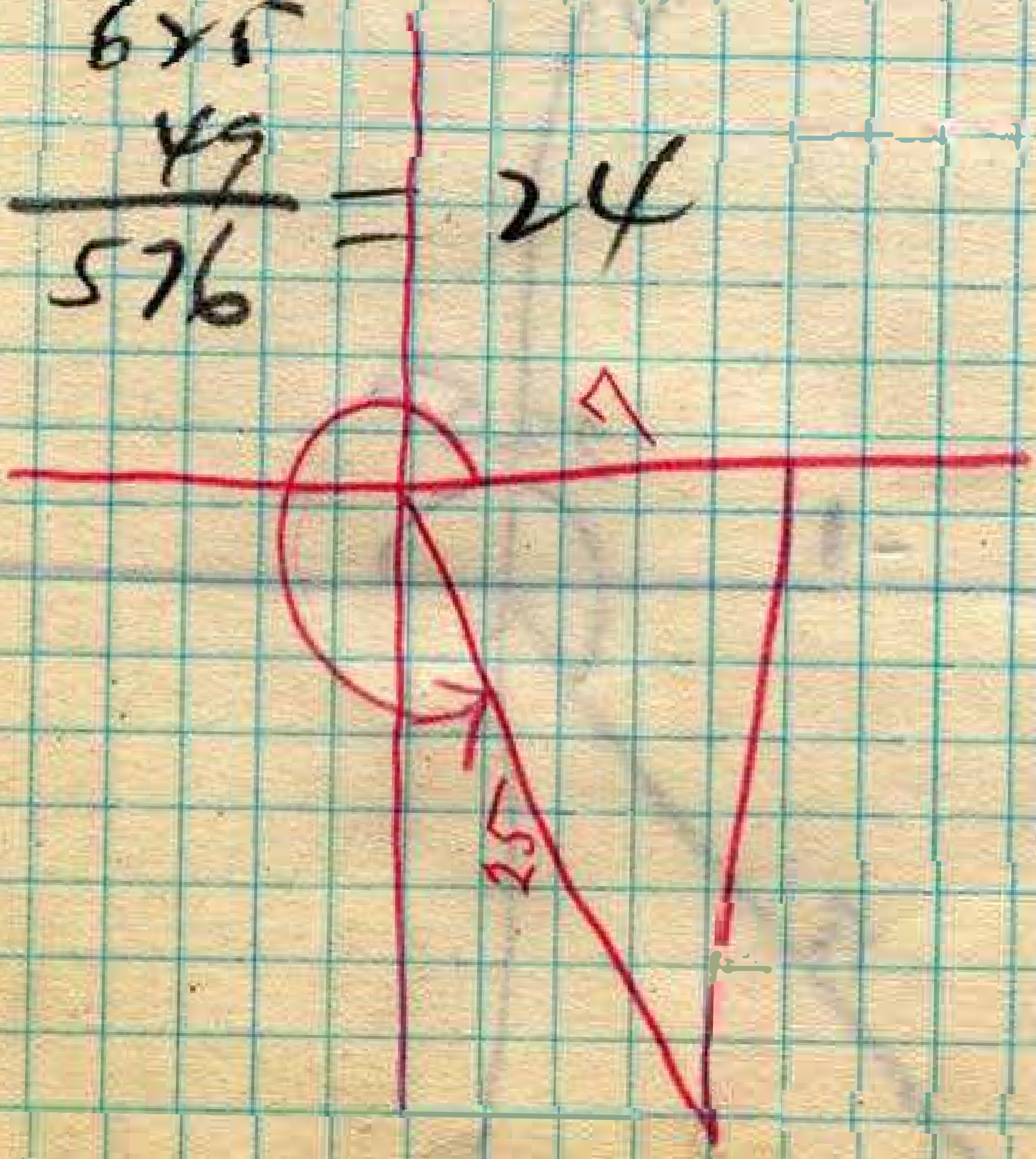
Page 117 No. 3

$\cos \theta = \frac{7}{25}$ fourth quadrant



$25^2 - 7^2 =$

$$\begin{array}{r} 625 \\ 49 \\ \hline 576 \end{array} = 24$$



$\sin \theta = -\frac{25}{45.42}$

$\cos \theta = \frac{7}{45.42}$

$\tan \theta = -25/7$

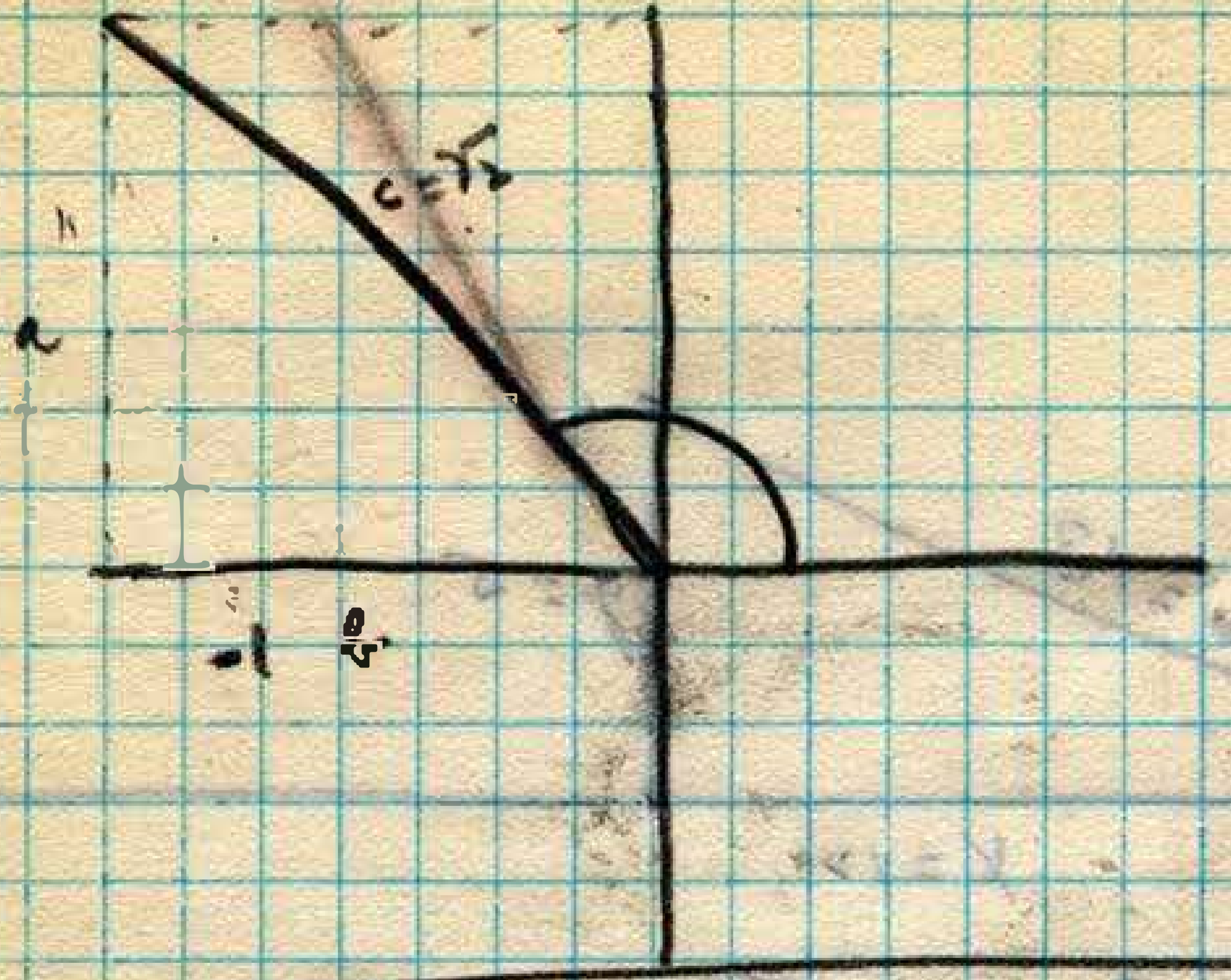
$\text{cotangent } \theta = -\frac{7}{25}$

$\sec \theta = 45.42/7$

$\operatorname{cosec} \theta = -\frac{45.42}{25}$

$\frac{25}{-24}$

$\sin 135^\circ = \frac{a}{c} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$ ✓



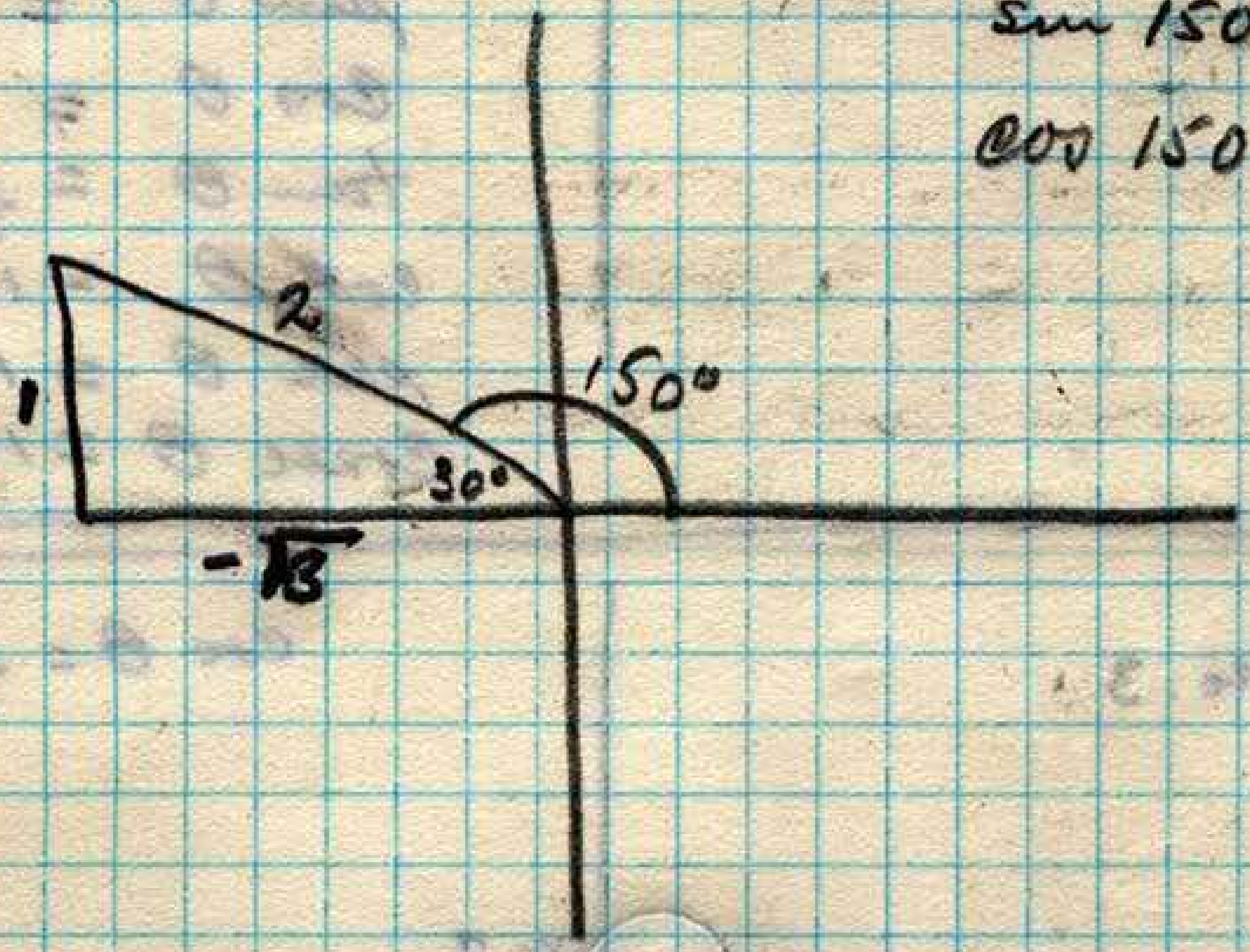
$45^\circ \rightarrow a = 1,\ b = 1,\ c = \sqrt{2}$

$60^\circ \rightarrow a = \sqrt{3},\ b = 1,\ c = 2$

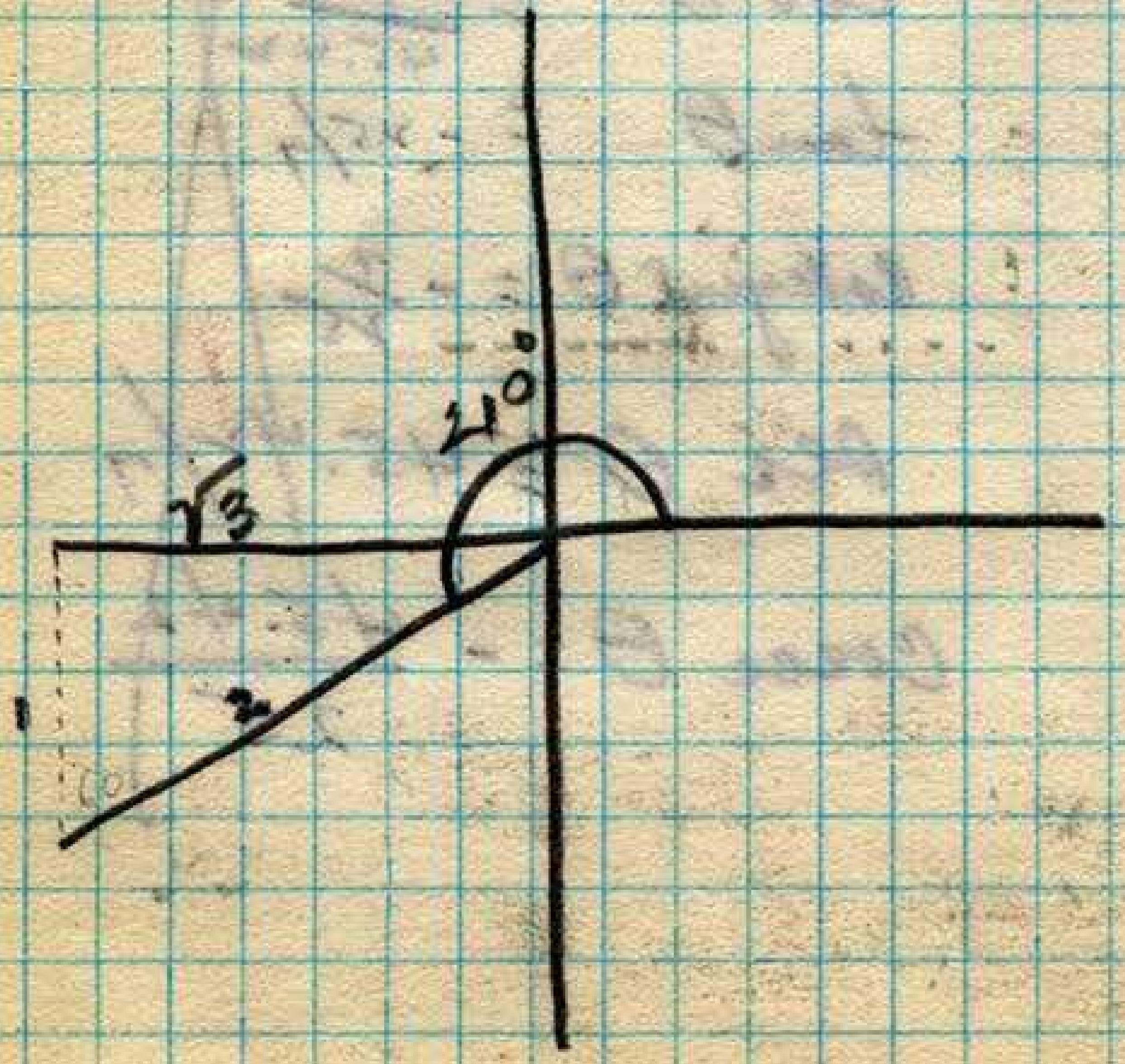
$30^\circ \rightarrow a = 1,\ b = \sqrt{3},\ c = 2$

$\sin 150^\circ = \frac{a}{c} = \frac{1}{2} = \frac{1}{2}$

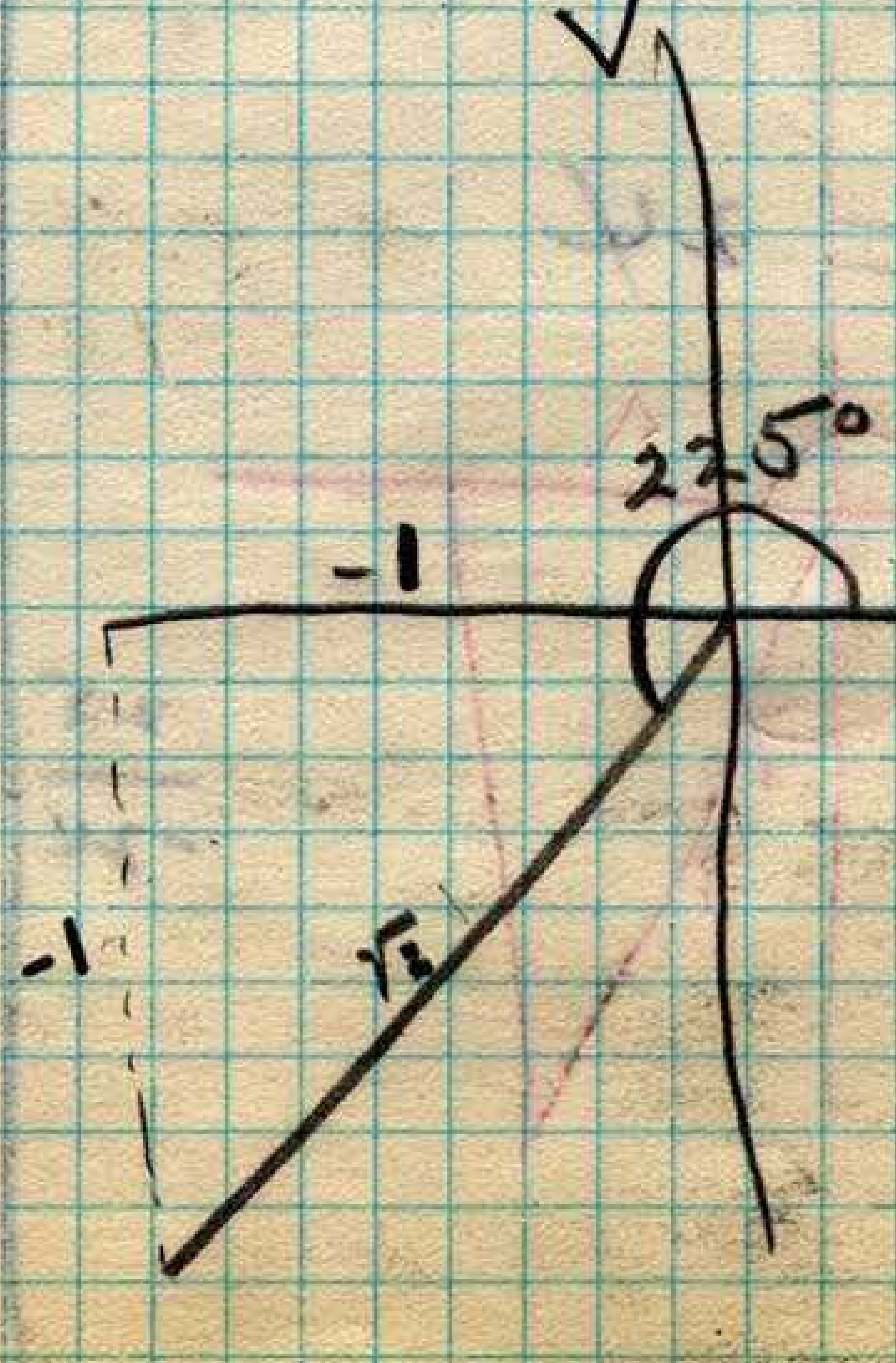
$\cos 150^\circ = \frac{b}{c} = \frac{-\sqrt{3}}{2}$



$\cos 210^\circ = -\frac{\sqrt{3}}{2}$ ✓

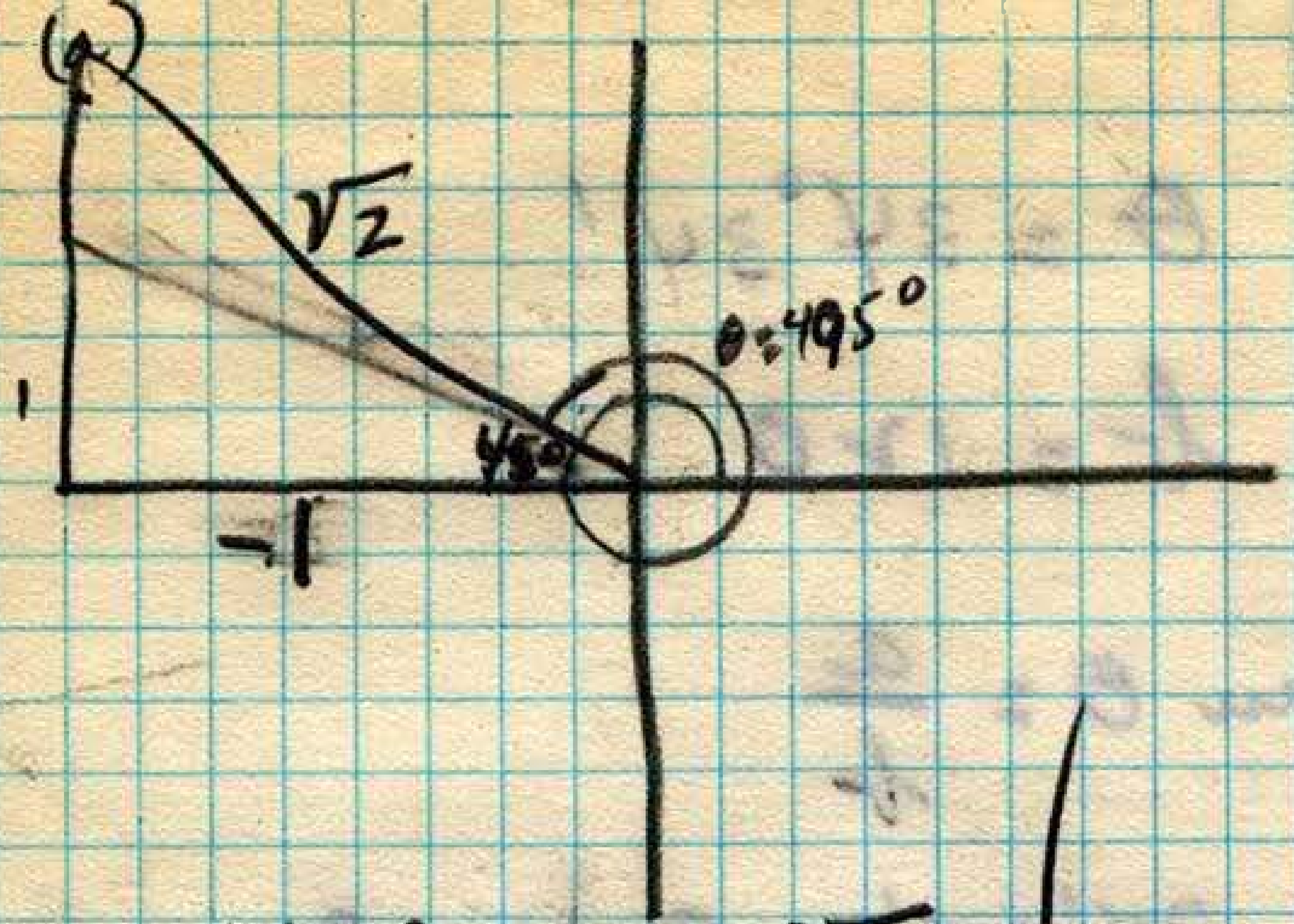


$\tan 225^\circ = \frac{-1}{-1} = +1$ ✓



Northcott Page 23 6, a, b, c

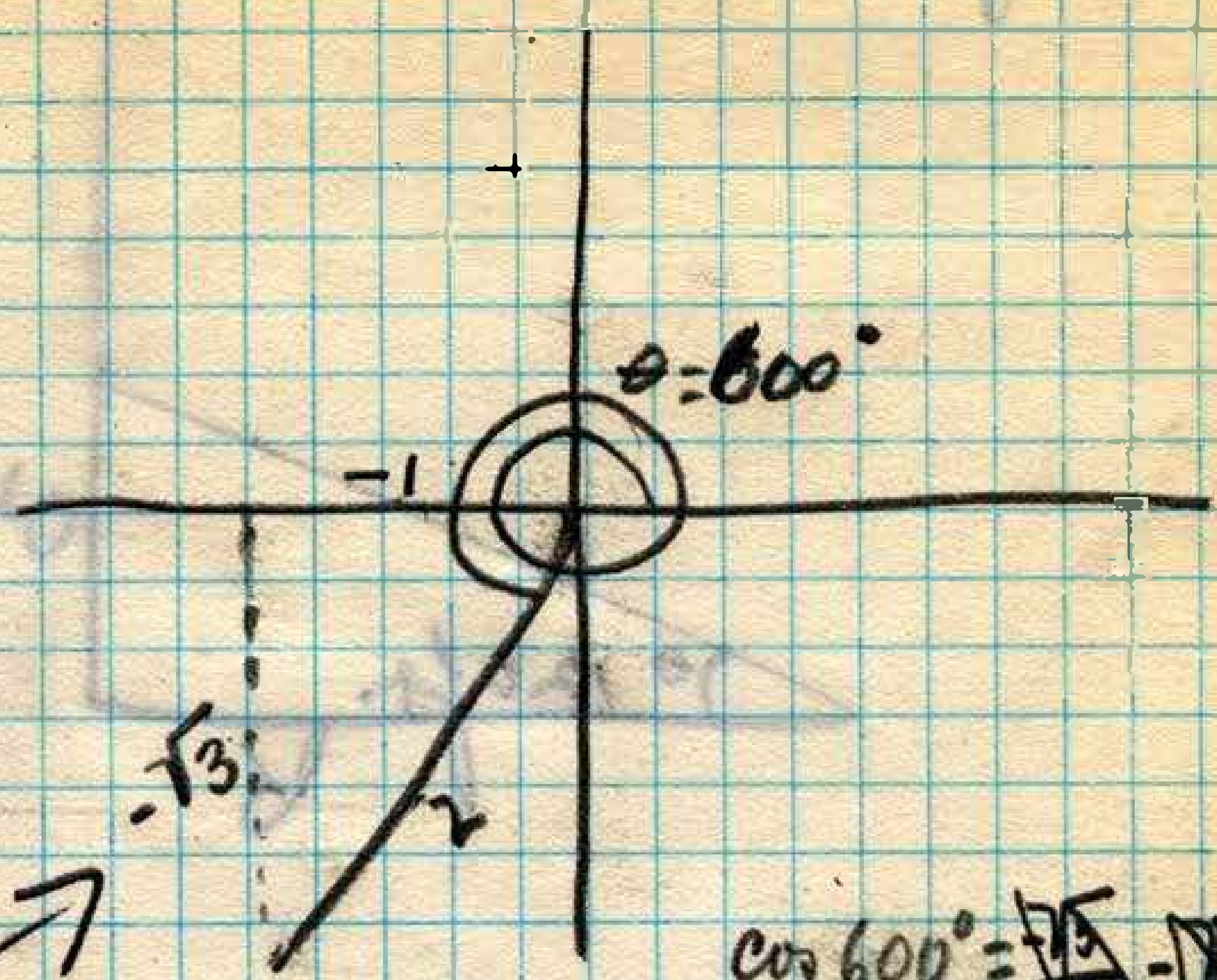
(a)



$\sin 495° = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$ ✓

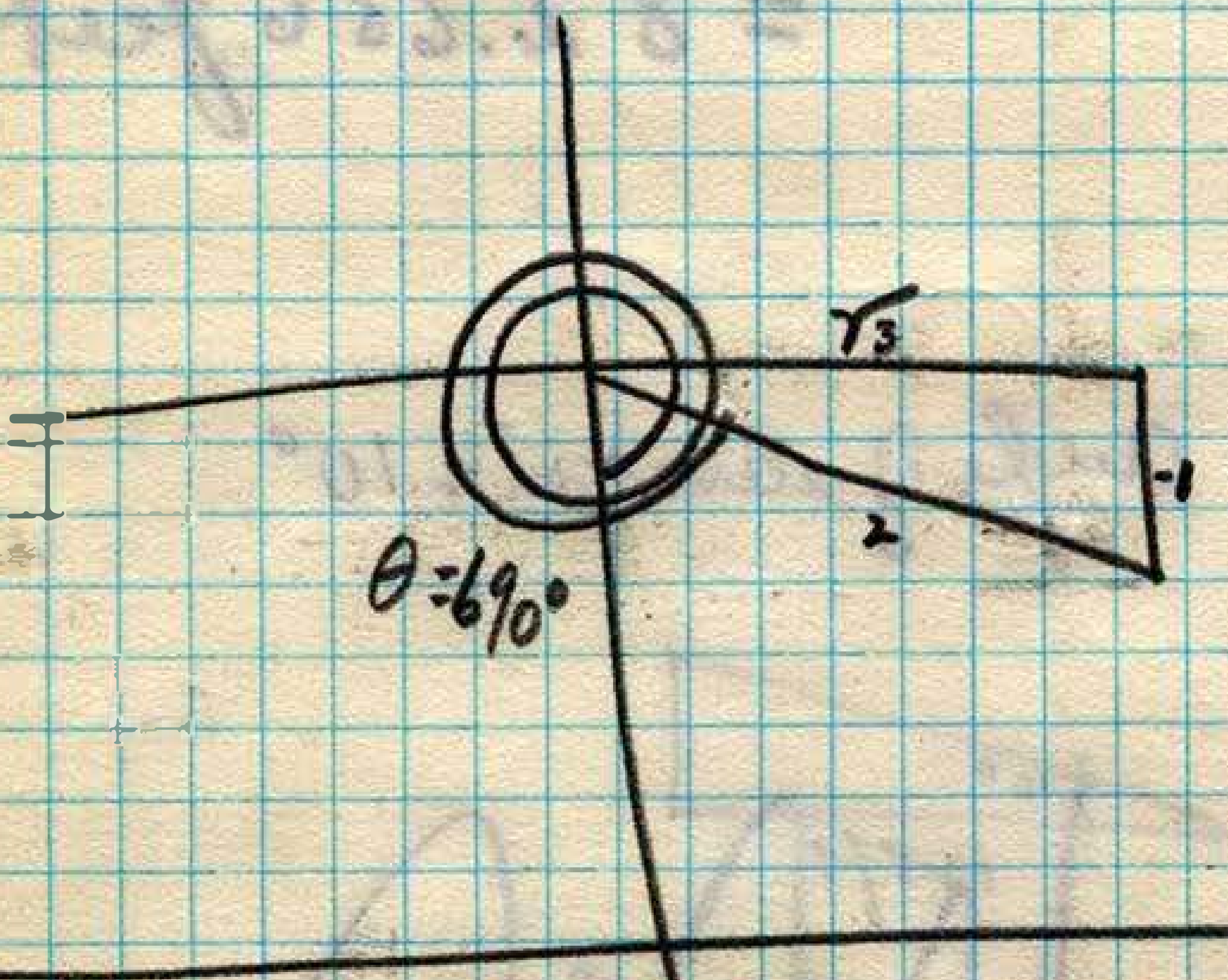
(*) Question regarding Fig. 21 page 22

(b)



$\cos 600° = \frac{-1}{2} = -\frac{1}{2}$

(c)



$\tan 690° = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$ ✓

Page 23 No. 10 $\sin 120° \cos 30° - \cos 120° \sin 30°$

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

$= \frac{3}{4} + \frac{1}{4} = 1$ ✓

Pg 23 No. 13

Prove $\frac{\sin 150°}{\sin 30°} - \frac{\cos 150°}{\cos 30°} = 2$ ✓

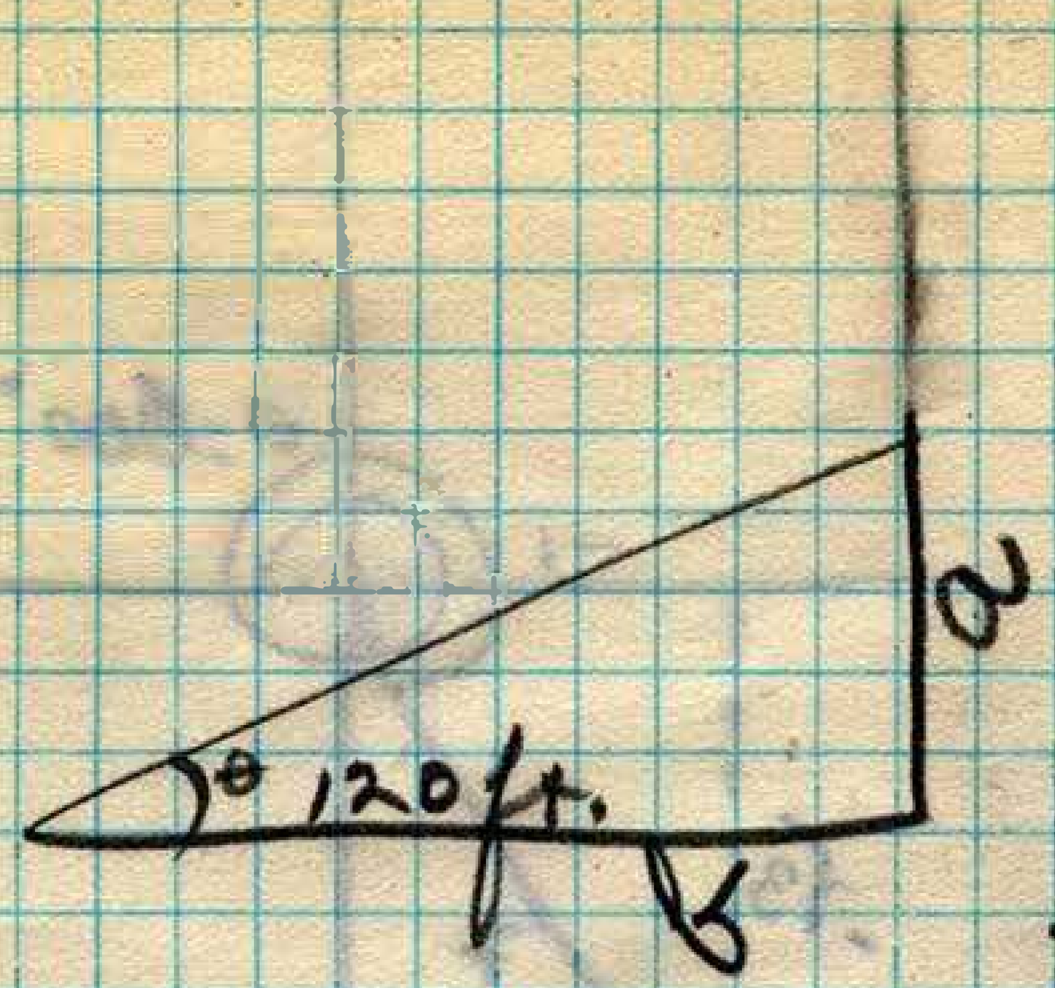
$\frac{\frac{1}{2}}{\frac{1}{2}} - \left(\frac{-\frac{\sqrt{3}}{2}}{\sqrt{3}/2}\right) = 1 + 1 = 2$

Pg 23 No. 15 Prove that

$\frac{\tan 45° + \tan 30°}{1 - \tan 45° \tan 30°} = 2 + \sqrt{3}$

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

Pg 116 No. 9



$\theta = 34°34'$

$b = 120$

$\tan\theta = \frac{a}{b}$

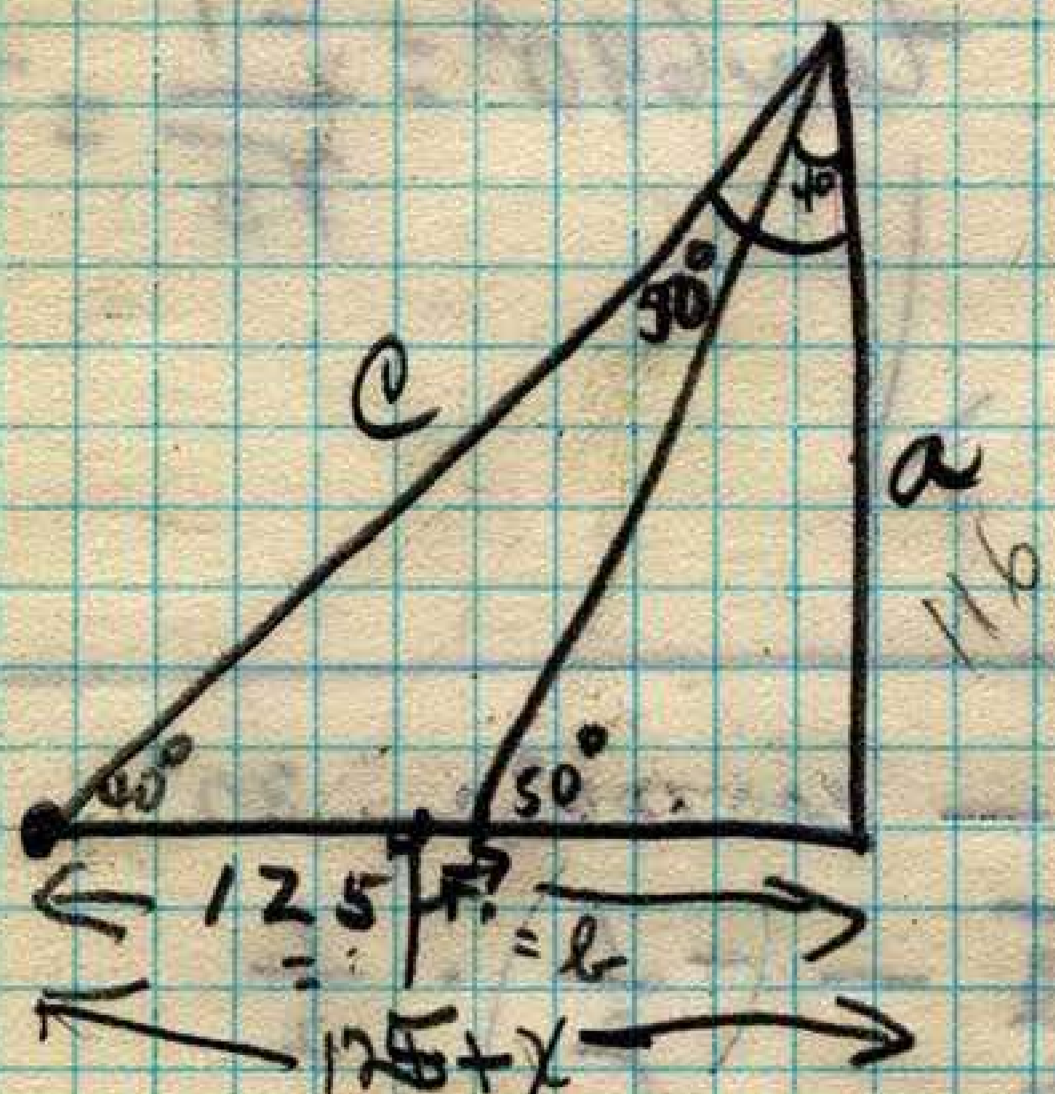
$\tan 34°34' = \frac{a}{b} = \frac{a}{120}$

$.6888 = \frac{a}{120}$

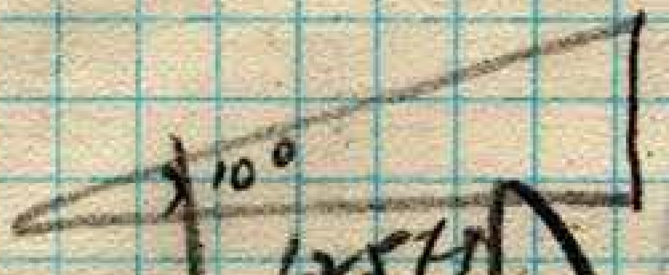
$a = 120 \times .6888$

$= 82.656$ feet

Pg. 117 No. 12



angle of elevation = 10°



$\tan 10° = \frac{a}{125}$

$.1763 = \frac{a}{125}$

$a = 125 \times .1763$

$= 42.0475$ ft.

Or log a = log tan 10° × log 125

.9691

Sioam — Page 140 — No. 8, 13, 21, 32

Page 142 — No. 7, 9, 11, 16, 19

Page 144 Formulas 1 + 2
143 " 3

146 " 5, 6, 7

Page 146 Nos. 4 + 5
147 No. 17 + 23
Page 44 Nos. 13 + 14
Page 45 No. 7, 9, 22

Page 44 No. 13

$$\frac{\sqrt{6a^3b^2}}{\sqrt[4]{2ab^5}} = \frac{\sqrt{6a^3b^2} \cdot \sqrt[4]{2ab^5}}{2ab^5}$$

$x + 2 = x + 2\sqrt{x} + 1$

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

$\frac{1}{4} = x$

$\frac{138}{116} = 1.19$

$\frac{x}{a} = .83$

$a = .83x$

$\frac{125 + x}{.83x} = 1.19$

$125 + x = 1.19 \cdot .83x$

$= 9.877x$

$8.88x = 125$

$x = 13+$

$13 + 125 = 138$

$\frac{138}{a} = 1.19$

$\frac{a}{x} = \frac{1}{}$ $\frac{x}{a}$

$(1 - \cos x)(2 + 3\cos x)$

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

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

$\cos = \frac{\left(\frac{2}{\cos} + 3\right)}{2}$

$= \frac{2 + 3\cos}{\cos} \cdot \frac{1}{2}$

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

$\cos$

$(a^3)^{\frac{5}{6}} = a^{\frac{5}{2}}$

$\frac{2}{\sqrt{3}}$ $\frac{2\sqrt{3}}{3}$

$1.7321/2$

$\sqrt[5]{2^5} = 2$

$\sqrt[5]{a^5} = a$

Pg 44 No. 13

$$\frac{\sqrt{6a^3b^2}}{\sqrt[4]{2ab^5}} = \frac{\sqrt[4]{36a^6b^4}}{\sqrt[4]{2ab^5}} = \frac{\sqrt[4]{2^2 3^2 a^6 b^4}}{\sqrt[4]{2ab^5}} = \frac{\sqrt[4]{18a^5}}{\sqrt[4]{b}} \cdot \frac{\sqrt[4]{b^3}}{\sqrt[4]{b^3}}$$

correct? $= \frac{1}{b}\sqrt[4]{18a^5b^3}$

No. 14

$$\frac{\sqrt[2]{2a^3b^2c^5}}{\sqrt[5]{a^4b^3c^7}} = \frac{\sqrt[10]{2^5a^{15}b^{10}c^{25}}}{\sqrt[10]{a^8b^6c^{14}}} = \sqrt[10]{32a^7b^4c^{11}} = c\sqrt[10]{32a^7b^4c}$$

$$\cancel{= \frac{\sqrt[5]{2^5a^8b^7c^{10}}}{\sqrt[5]{a^4b^3c^7}} = 2\sqrt{a^4b^4c^3} = 2a^2b^2c\sqrt{c}}$$

Page 45 No. 7

$$\frac{(7\sqrt{3}+2\sqrt{5})(2\sqrt{3}+\sqrt{5})}{(2\sqrt{3}-\sqrt{5})(2\sqrt{3}+\sqrt{5})} = \frac{42+11\sqrt{15}+10}{12 - 5} = \frac{52+11\sqrt{15}}{\cancel{17}\ 7}$$

Page 45 No. 9

$$\frac{\left(\sqrt{\frac{7}{3}}+\sqrt{\frac{3}{5}}\right)\left(\sqrt{\frac{7}{3}}+\sqrt{\frac{3}{5}}\right)}{\left(\sqrt{\frac{7}{3}}-\sqrt{\frac{3}{5}}\right)\left(\sqrt{\frac{7}{3}}+\sqrt{\frac{3}{5}}\right)} = \frac{\frac{7}{3}+2\sqrt{\frac{7}{3}\cdot\frac{3}{5}}+\frac{3}{5}}{\frac{7}{3}-\frac{3}{5}} = \frac{\frac{35}{15}+2\sqrt{\frac{21}{15}}+\frac{9}{15}}{\frac{26}{15}}$$

$$= \left(\frac{44}{15}+2\sqrt{\frac{21}{15}}\right)\cdot\frac{15}{26}$$

$$= \left(\frac{44}{15}+\frac{2}{5}\sqrt{35}\right)\cdot\frac{15}{26} = \left(\frac{44}{15}+\frac{2\sqrt{35}}{5}\right)\cdot\frac{15}{26}$$

$$= \frac{44+6\sqrt{35}}{15}\cdot\frac{15}{26} = \frac{44+6\sqrt{35}}{26}$$

$$= \frac{22+3\sqrt{35}}{13}$$

Pg 140 No. 8 Prove $\tan^2\alpha = \dfrac{1-\cos^2\alpha}{\cos^2\alpha}$

add 1 to each side

$$\tan^2\alpha + 1 = \frac{1-\cos^2\alpha}{\cos^2\alpha} + 1 = ✓$$

$$\frac{1-\cos^2\alpha+\cos^2\alpha}{\cos^2\alpha} = \frac{1}{\cos^2\alpha}$$

$$\tan^2\alpha = \frac{\sin^2\alpha}{\cos^2\alpha} = \frac{1-\cos^2\alpha}{\cos^2\alpha}$$

$$\sec^2\alpha = \frac{1}{\cos^2\alpha} = \frac{1-\cos^2\alpha}{\cos^2\alpha} + 1$$

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

$$1 = 1 ✓$$

Page 140 No. 13 Prove $\dfrac{1+\cot^2\beta}{1+\tan^2\beta} = \cot^2\beta$

$$1 + \cot^2\beta = \cot^2\beta\,(1+\tan^2\beta)$$

$$= \cot^2\beta\left(1 + \frac{1}{\cot^2\beta}\right)$$

$$= \cot^2\beta + \frac{\cot^2\beta}{\cot^2\beta} = \cot^2\beta + 1 ✓$$

Page 140 No. 21 Prove $\dfrac{1-2\cos^2 x}{\sin x\cos x} = \tan x - \cot x$

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

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

$$= 1 - \cos^2 x - \cos^2 x$$

$$= 1 - 2\cos^2 x ✓$$

Page 140 No. 32 Prove $\dfrac{\sin x}{1+\cos x} + \dfrac{1+\cos x}{\sin x} = 2\csc x$

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

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

$$\sin^2 x + 1 + 2\cos x + \cos^2 x = 2 + 2\cos x$$

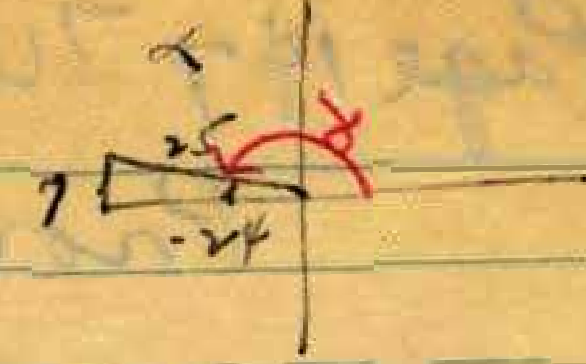
$$\sin^2 x + 1 + \cos^2 x = 2$$

$$1 + 1 = 2 ✓$$

Page 146 No. 5

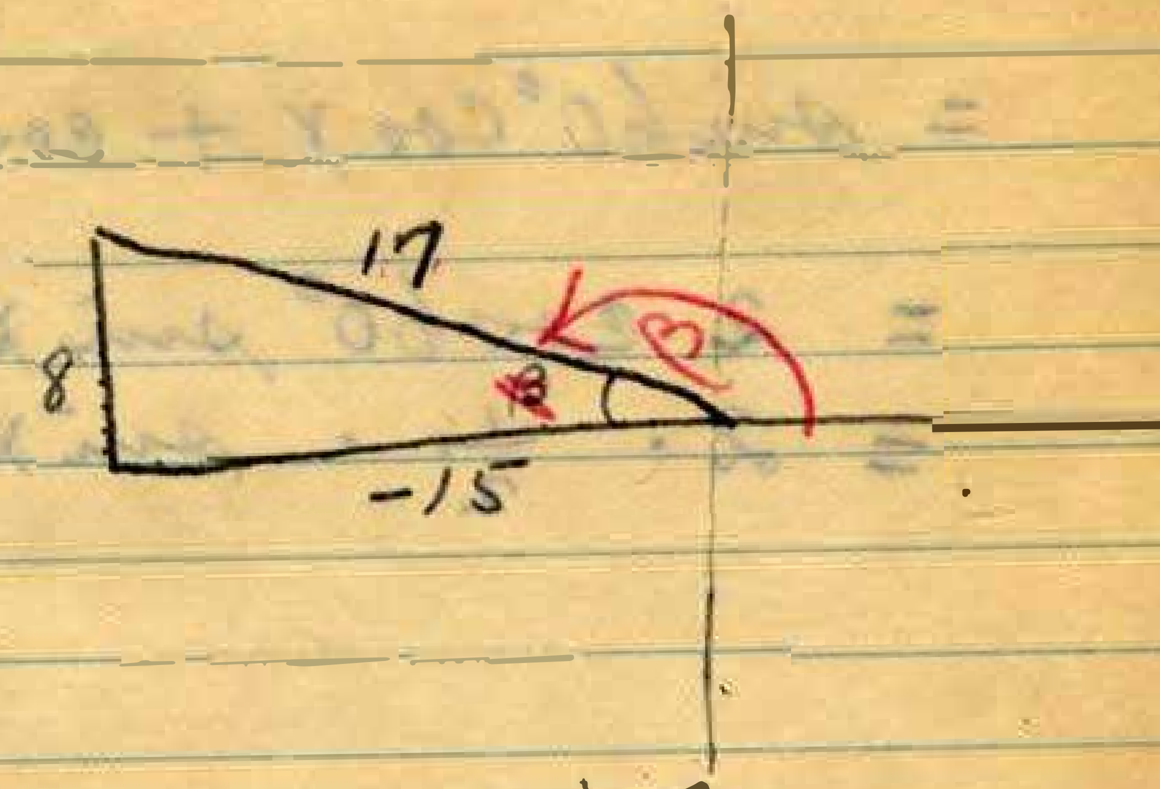
$\sin\alpha = \frac{7}{25}$

$\tan\beta = -\frac{8}{15}$



For α, $a = 7$
$b = -24$
$c = 25$

For β, $a = 8$
$b = -15$
$c = 17$



$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$
$$= \frac{7}{25}\cdot -\frac{15}{17} + \frac{-24}{25}\cdot\frac{8}{17}$$
$$= \left(-\frac{105}{425}\right) + \left(-\frac{192}{425}\right) = -\frac{297}{425}$$

$$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$$
$$= -\frac{24}{25}\cdot\frac{-15}{17} - \frac{7}{25}\cdot\frac{8}{17}$$
$$= \frac{360}{425} - \frac{56}{425} = \frac{304}{425}$$

~~sin(α+β)~~

$$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$$
$$= \left(\frac{7}{25}\cdot -\frac{15}{17}\right) - \left(\frac{-24}{25}\cdot\frac{8}{17}\right) = \frac{-105}{425} + \frac{192}{425}$$
$$= \frac{87}{425}$$

$$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$
$$= \left(-\frac{24}{25}\cdot -\frac{15}{17}\right) + \left(\frac{7}{25}\cdot\frac{8}{25}\right)$$
$$= \frac{360}{425} + \frac{56}{425} = \frac{416}{425}$$

Page 147 No. 17

Prove $\sin(60° + x) - \cos(30° + x) = \sin x$

$\sin 60° \cancel{\cos} x + \cos 60° \sin x - (\cos 30° \cos x - \sin 30° \sin x)$

$= \sin 60° \cos x + \cos 60° \sin x - \cancel{\sin 60°} \cos x + \cos 60° \sin x$

$= 2 \cos 60° \sin x$

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

Page 147 No. 23

Prove $\sin \overset{\alpha}{\widehat{3\theta}} \cos \overset{\beta}{\theta} - \cos 3\theta \sin \theta = \sin 2\theta$

$\sin(\alpha - \beta) = \sin(3\theta - 2\theta) = \sin 2\theta$

Northcott

Page 85 —— No. 2, 3, 10

88 —— No. 1, 2,

Read page 34

Page 36 No. 1, 2, 3, 6, 7

Susain Page 165 No. 1, 4

170 No. 14

Smith, Longley, Wilson Page 8 No 1 a, c, e

2 c.

3 a

7

8

9 c

10

Page 9 c, e, f

Page 142 no. 7

$$5\cos x + 2 = 3(2-\cos x)$$
$$= 6 - 3\cos x$$
$$8\cos x = 4$$
$$\cos x = \frac{1}{2}$$

$\angle x = 60^\circ$ or 300°

Page 142 no. 9

$$\sqrt{2}\tan x \sin x + \tan x = 0$$
$$\tan x(\sqrt{2}\sin x + 1) = 0$$

If $\tan x = 0$,
Then $x = 0^\circ$ or 180°

$$\sqrt{2}\sin x + 1 = 0$$
$$\sqrt{2}\sin x = -1$$
$$2\sin x = -\sqrt{2}$$
$$\sin x = -\frac{\sqrt{2}}{2}$$

Then $x = 225^\circ$ or 315°

Page 142 no. 11

$$2\sin^2 x + 3\cos x = 0$$
$$2(1-\cos^2 x) + 3\cos x = 0$$
$$2 - 2\cos^2 x + 3\cos x = 0$$
$$2\cos^2 x - 3\cos x - 2 = 0$$
$$(2\cos x + 1)(\cos x - 2) = 0$$

Thus $\cos x = -\frac{1}{2}$ or 2

for $\angle = 120^\circ$ or 240° ? no such angle ?

Page 147 No. 16

$$3 \csc^2 x + \cot^2 x = 15$$

$$3(\cot^2 x + 1) + \cot^2 x = 15$$

$$3 \cot^2 x + 3 + \cot^2 x = 15$$

$$4 \cot^2 x = 12$$

$$\cot^2 x = 3$$

$$\cot x = \sqrt{3} \text{ or } -\sqrt{3}$$

If $\cot x = \sqrt{3}$, $\angle x = 30^\circ$ or 210°

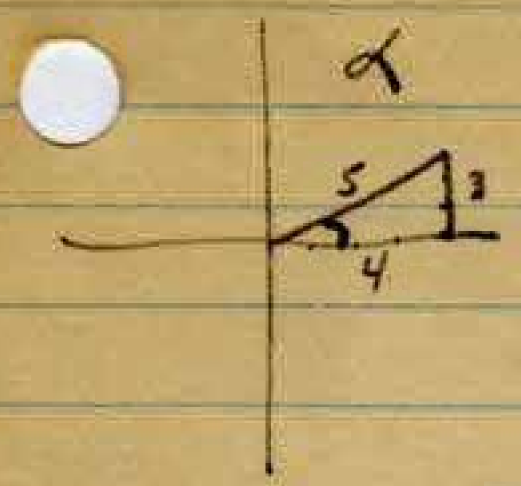
If $\cot x = -\sqrt{3}$, $\angle x = 150^\circ$ or 330°

Page 146 No. 4 $\qquad \sin\alpha = \frac{3}{5} \quad \cos\beta = \frac{5}{13} \qquad \alpha + \beta$ in first quadrant

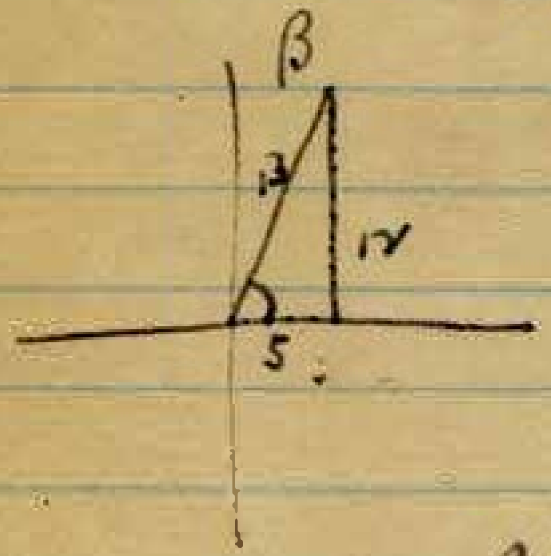
$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$
$$= \frac{3}{5}\cdot\frac{5}{13} + \frac{4}{5}\cdot\frac{12}{13}$$
$$= \frac{3}{13} + \frac{48}{65} = \frac{\cancel{45}\ 15 + 48}{65} = \frac{\cancel{93}\ 63}{65}$$

For α, $a = 3$, $b = 4$, $c = 5$

For β $a = 12$, $b = 5$, $c = 13$



$$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$$
$$= \frac{4}{5}\cdot\frac{5}{13} - \frac{3}{5}\cdot\frac{12}{13}$$
$$= \frac{20}{65} - \frac{36}{65} = -\frac{16}{65}$$



$$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$$
$$= \frac{3}{5}\cdot\frac{5}{13} - \frac{4}{5}\cdot\frac{12}{13}$$
$$= \frac{15}{65} - \frac{48}{65} = -\frac{33}{65}$$

$$\sin^2(\alpha+\beta) + \cos^2(\alpha+\beta) = \frac{3969}{4225} + \frac{256}{4225} = 1$$

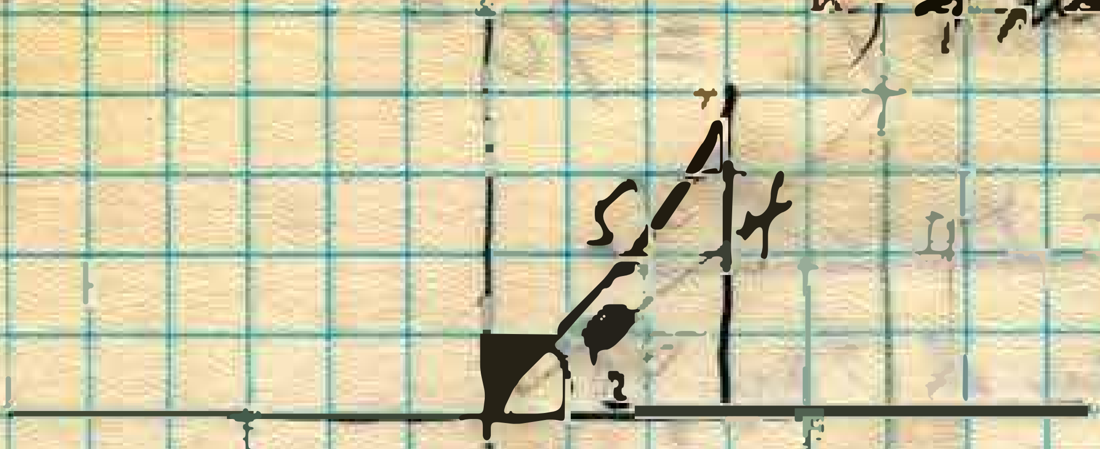
$$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$
$$= \frac{4}{5}\cdot\frac{5}{13} + \frac{3}{5}\cdot\frac{12}{13}$$
$$= \frac{20}{65} + \frac{36}{65} = \frac{56}{65}$$

No. 5

Northcutt

Page 85 No. 2

a) Find $\cos\left(\arcsin \frac{4}{5}\right)$



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

$a = 4$

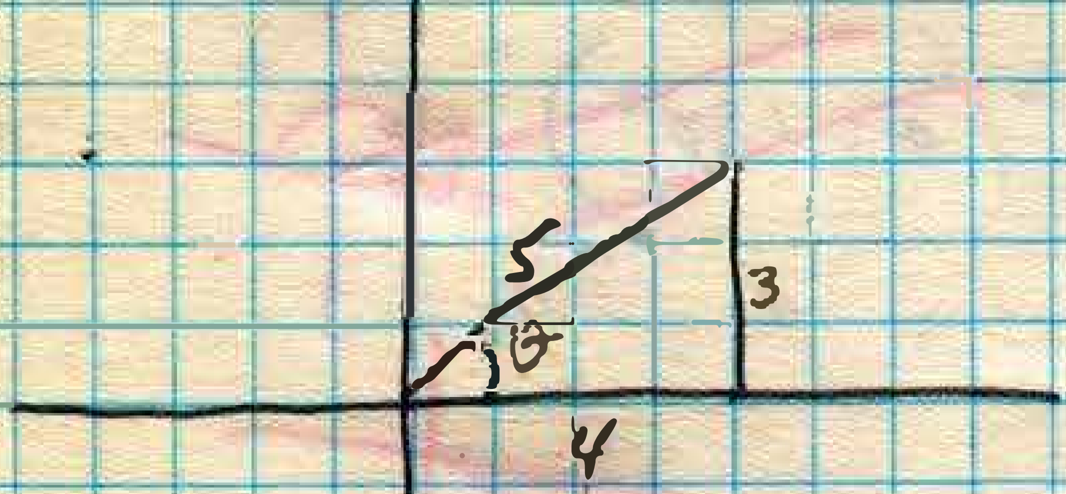
$c = 5$

$b = \sqrt{25-16} = 3$

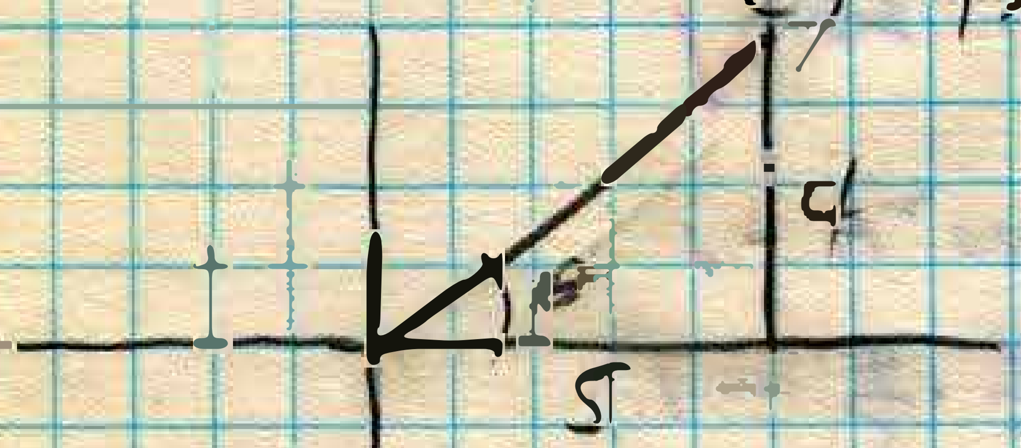
$\cos\theta = \frac{3}{5}$

b) Find $\sin\left(\arccos \frac{4}{5}\right)$

$\sin\theta = \frac{3}{5}$



c) Find $\tan\left(\text{arc cot} \frac{5}{4}\right)$



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

Page 5 No. 3

Prove $\arctan \frac{2}{3} + \arctan \frac{1}{5} = 45°$

$\tan\alpha = \frac{2}{3}$ $\tan\beta = \frac{1}{5}$

$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha \tan\beta}$$

$$= \frac{\frac{2}{3} + \frac{1}{5}}{1 - \left(\frac{2}{3}\cdot\frac{1}{5}\right)}$$

$$= \frac{\frac{10}{15} + \frac{3}{15}}{1 - \frac{2}{15}} = \frac{\frac{13}{15}}{\frac{13}{15}} = 1$$

$\therefore \alpha + \beta = 45°$

Page 85 No. 10

Prove $\overbrace{\text{arc tan } 2}^{\alpha} + \overbrace{\text{arc tan } \tfrac{1}{2}}^{\beta} = 90°$

$$\tan(\alpha+\beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha \tan\beta}$$

$$= \frac{2+\frac{1}{2}}{1 - 2\cdot\frac{1}{2}} = \frac{2\frac{1}{2}}{1-1} = \frac{2\frac{1}{2}}{0} = \infty$$

$$\cancel{= 0}$$

$\therefore \alpha + \beta = 90°$ ~~(or 180°)~~

Page 88 No. 1 Find values

a) $\sin(2 \overbrace{\text{arc sin } \tfrac{4}{5}}^{A})$ $\cos A = 3/5$

$$\sin 2A = 2 \sin A \cos A$$
$$= 2\cdot\frac{4}{5}\cdot\frac{3}{5} = \frac{24}{25}$$ ✓

b) $\cos(2 \overbrace{\text{arc cos } \tfrac{4}{5}}^{A})$

$$\cos 2A = 2\cos^2 A - 1$$
$$= 2\cdot\frac{4}{5}\cdot\frac{4}{5} - 1$$
$$= \frac{32}{25} - 1 = \frac{7}{25}$$ ✓

c) $\tan(2 \overbrace{\text{arc tan } \tfrac{4}{5}}^{A})$

$$\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$$
$$= \frac{2\cdot\frac{4}{5}}{1 - \frac{4}{5}\cdot\frac{4}{5}} = \frac{\frac{8}{5}}{\frac{9}{25}} = \frac{8}{5} \times \frac{25}{9} = \frac{40}{9}$$ ✓

d) $\cos(2 \overbrace{\text{arc tan } \tfrac{5}{12}}^{A})$

$\sqrt{25+144} = 13$

$$\cos 2A = 2\cos^2 A - 1$$
$$= 2\cdot\left(\frac{12}{13}\right)^2 - 1 = \frac{288}{169} - 1 = \frac{119}{169}$$ ✓

e) $\sin(\tfrac{1}{2} \text{arc tan } \tfrac{5}{12})$

angle must be positive

$$\sin\frac{A}{2} = \pm\sqrt{\frac{1-\cos A}{2}} = \sqrt{\frac{1-\frac{12}{13}}{2}}$$
$$= \sqrt{\frac{1}{13}\cdot\frac{1}{2}} = \sqrt{\frac{1}{26}} = \frac{1}{\sqrt{26}} = \frac{\sqrt{26}}{26}$$ ✓

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Page 89 No. 2

Find values

Note: Ask about (+ and − angles?)

a) $\sin\left(\frac{1}{2} \text{arc} \cos \frac{4}{5}\right)$

$$\sin \frac{A}{2} = \pm\sqrt{\frac{1-\cos A}{2}}$$

$$= \sqrt{\frac{1-\frac{4}{5}}{2}} = \sqrt{\frac{1}{10}}$$

$$= \frac{\sqrt{10}}{10}$$

b) $\cos\left(\frac{1}{2} \text{arc} \sin \frac{4}{5}\right)$

$$\cos \frac{A}{2} = \pm\sqrt{\frac{1+\cos A}{2}} = +\sqrt{\frac{1+\frac{3}{5}}{2}} = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$$

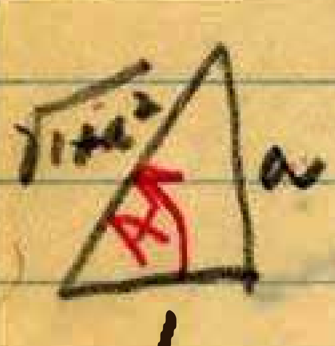
c) $\tan(2 \text{arc} \tan a)$

$$\tan 2A = \frac{2\tan A}{1-\tan^2 A}$$

$$= \frac{2a}{1-a^2}$$

d) $\sin(2 \text{arc} \tan a)$

$$\sin 2A = 2 \sin A \cos A$$



$$\tan A = \frac{a}{1}$$

$$\therefore \cos A = \frac{1}{\sqrt{1+a^2}}$$

$$\therefore \sin A = \frac{a}{\sqrt{1+a^2}}$$

$$= \frac{2a \cdot 1}{\sqrt{1+a^2} \cdot \sqrt{1+a^2}}$$

$$= \frac{2a}{1+a^2}$$

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Page 36 1, 2, 3, 6, 7

1. change the following angles to degrees

a) $\frac{\pi}{3}$ radians $= \frac{180^\circ}{3} = 60^\circ$

b) $\frac{3\pi}{4}$ radians $= \frac{3}{4} \cdot 180^\circ = \frac{540^\circ}{4} = 135^\circ$

x radians $= \frac{x\, 180^\circ}{\pi}$

c) $\frac{7\pi}{6}$ radians $= \frac{7}{6} \cdot 180^\circ = 210^\circ$

d) 4 radians $= \frac{4 \times 180^\circ}{\pi} = \frac{720^\circ}{\pi}$

$\times 7$
60
520

e) $\frac{\pi}{8}$ radians $= \frac{180^\circ}{8} = 22.5^\circ$

---

2. Change the following angles to radian measure

a) 105°

π radians $= 180^\circ$

1 radian $= \frac{180^\circ}{\pi}$

$x^\circ = \frac{x \cdot \pi}{180}$ radians

$1^\circ = \frac{\pi}{180}$ radians

$\therefore 105^\circ = \frac{105\pi}{180}$ radians $= \frac{7\pi}{12}$ radians

b) $225^\circ = \frac{225\pi}{180}$ ~~radians~~ $= \frac{15\pi}{12}$ ~~radians~~ $= \frac{5\pi}{4}$ radians

c) $87^\circ 30' = \left(\frac{87^\circ 30'}{180^\circ}\right)\pi$ " $= \frac{5250\pi}{10800}$ π $= \frac{35\pi}{72}$ "

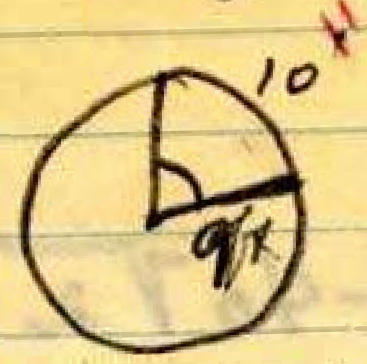
Follow it + check & book

d) $12^\circ = \frac{12\pi}{180}$ " $= \frac{\pi}{15}$ radians

e) $270^\circ = \frac{270\pi}{180}$ " $= \frac{3\pi}{2}$ radians

Northcott Page 36

No. 3



arc length = radius × radians

Radians = $\frac{\text{arc length}}{\text{radius}} = \frac{10}{108} = \frac{5}{54}$

$\frac{5}{54}$ radians = $\frac{5}{\cancel{54}_{3}} \cdot \frac{\cancel{180^\circ}^{10}}{\pi} = \frac{50^\circ}{3\pi}$

No. 6 Wheel = 24 inches in diameter
5 revolutions per second

Circumference $(2\pi r)$

$5 \cdot 24\pi = 120\pi$ inches in 5 sec.

In one hour, distance $= 60 \cdot 60 \cdot 120\pi$ inches

No. miles $= \frac{60 \cdot 60 \cdot 120\pi}{5280 \cdot 12} = \frac{432000\pi}{63360}$

$= 6.8\pi = 21.36$ miles

No. 7 Radian measure of two angles of △ are $\frac{\pi}{4}$ + $\frac{2\pi}{3}$.

Total radians in given angles $= \frac{\pi}{4} + \frac{2\pi}{3} = \frac{11\pi}{12}$

π radians $= 180^\circ$

$\pi - \frac{11\pi}{12} = \frac{\pi}{12}$

$\frac{\pi}{12}$ radians $= \frac{\pi \, 180^\circ}{12\pi} = 15^\circ$

Sisam Page 165 No. 1

$$\begin{cases} b = 5 \\ c = 8 \end{cases} \quad \{\alpha = 45^\circ$$

$$a^2 = b^2 + c^2 - 2bc\cos\alpha$$
$$= 25 + 64 - 2\cdot5\cdot8\cdot\frac{\sqrt{2}}{2} = 89 - 40\sqrt{2}$$

$$a = \sqrt{89 - 40\sqrt{2}} = \sqrt{89 - (40 \times 1.41)} = \sqrt{89 - 56.4} = \sqrt{32.6}$$
$$= 5.7$$ ✓

No. 4 $\quad a = 9, \quad b = 11 \quad c = 14$

$$a^2 = b^2 + c^2 - 2bc\cos\alpha$$

$$b^2 = a^2 + c^2 - 2ac\cos\beta$$

$$a^2 - b^2 - c^2 = -2bc\cos\alpha$$

$$\cos\alpha = \frac{b^2 + c^2 - a^2}{2bc} = \frac{121 + 196 - 81}{2 \times 11 \times 14}$$

$$= \frac{236}{308} = \frac{59}{77}$$ ✓

Page 170 No. 14

$|a|$

$|7| = 7$

$|-7| = 7$

$|2/5| = 2/5$

$|-2/5| = 2/5$

$$\boxed{\begin{array}{l} |a| = a \ (a > 0) \\ |a| = -a \ (a < 0) \end{array}}$$

$|0| = 0$