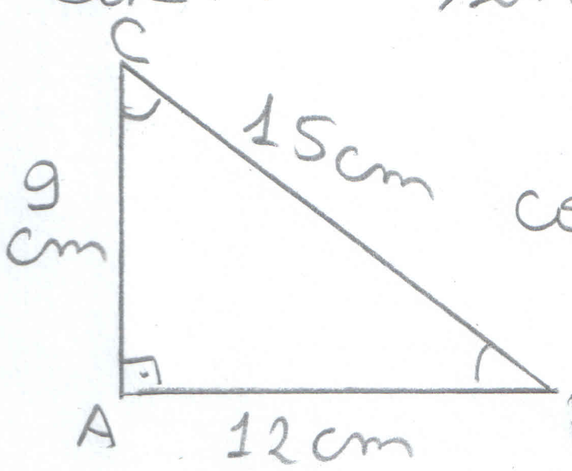
Lista 2

Q.1:



$\text{sen}\,\hat{B} = \frac{c.o}{hip.} = \frac{9^{\div 3}}{15_{\div 3}} = \frac{3}{5} = 0,6$

$\cos\hat{B} = \frac{c.a}{hip.} = \frac{12^{\div 3}}{15_{\div 3}} = \frac{4}{5} = 0,8$

$tg\,\hat{B} = \frac{c.o}{c.a.} = \frac{9^{\div 3}}{12_{\div 3}} = \frac{3}{4} = 0,75$

$cotg\,\hat{B} = \frac{c.a}{c.o} = \frac{12^{\div 3}}{9_{\div 3}} = \frac{4}{3} = 1,\overline{3}$

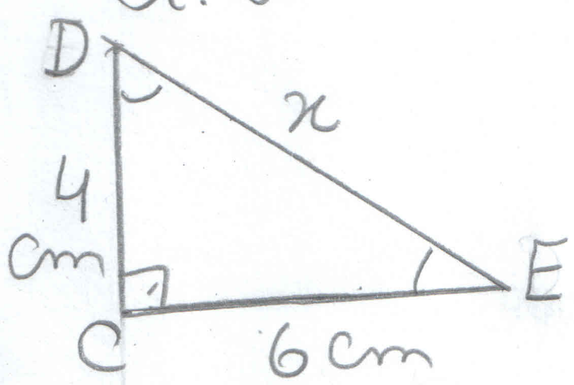
$\text{sen}\,\hat{C} = \frac{4}{5} = 0,8$

$\cos\hat{C} = \frac{3}{5} = 0,6$

$tg\,\hat{C} = \frac{4}{3} = 1,\overline{3} \approx 1,3$

$cotg\,\hat{C} = \frac{3}{4} = 0,75$

Q.2:



$(\overline{DE})^2 = (\overline{DC})^2 + (\overline{CE})^2$

$x^2 = 4^2 + 6^2$

$x^2 = 16 + 36$

$x^2 = 52$

$x = \sqrt{52}$

$x = \sqrt{2^2 \cdot 13} \Rightarrow x = 2\sqrt{13}$

$52 = 4 \cdot 13 = 2^2 \cdot 13$

a) $\text{sen}\,\hat{D} = \frac{c.o}{hip.} = \frac{6^{\div 2}}{2\sqrt{13}_{\div 2}} = \frac{3}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{3\sqrt{13}}{13}$

b) $\cos\hat{D} = \frac{c.a.}{hip.} = \frac{4^{\div 2}}{2\sqrt{13}_{\div 2}} = \frac{2}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{2\sqrt{13}}{13}$

c) $tg\,\hat{D} = \frac{c.o}{c.a} = \frac{6^{\div 2}}{4_{\div 2}} = \frac{3}{2} = 1,5$

d) $cotg\,\hat{D} = \frac{c.a}{c.o} = \frac{4^{\div 2}}{6_{\div 2}} = \frac{2}{3} = 0,\overline{6} \approx 0,67$

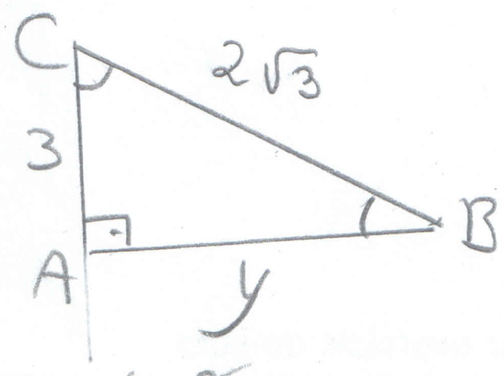
e) $\text{sen}\,\hat{E} = \frac{2\sqrt{13}}{13}$

f) $\cos\hat{E} = \frac{3\sqrt{13}}{13}$

g) $tg\,\hat{E} \approx 0,67$

h) $cotg\,\hat{E} = 1,5$

Q.3:



$(\overline{CB})^2 = (\overline{AC})^2 + (\overline{AB})^2$

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

$4 \cdot 3 = 9 + y^2$

$12 - 9 = y^2$

$y = \sqrt{3}$

$(\sqrt{3})^2 = 3$

$\text{sen}\,\hat{B} = \frac{3}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{3}}{2 \cdot 3} = \frac{\sqrt{3}}{2}$

$\cos\hat{B} = \frac{\sqrt{3}}{2\sqrt{3}} = \frac{1}{2}$

$tg\,\hat{B} = \frac{3}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{3}}{3} = \sqrt{3}$

$cotg\,\hat{B} = \frac{\sqrt{3}}{3}$

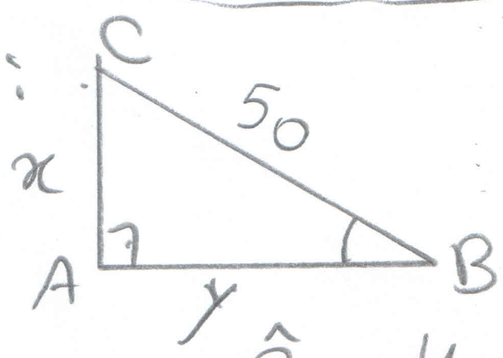
$\cos\hat{C} = \frac{\sqrt{3}}{2}$

$\text{sen}\,\hat{C} = \frac{1}{2}$

$tg\,\hat{C} = \frac{\sqrt{3}}{3}$

$cotg\,\hat{C} = \sqrt{3}$

Q.4:



$\text{sen}\,\hat{B} = \frac{4}{5}$

$\text{sen}\,\hat{B} = \frac{x}{50}$

$\frac{4}{5} = \frac{x}{50}$

$5x = 4 \cdot 50$

$5x = 200$

$x = \frac{200}{5}$

$x = 40$

$(\overline{BC})^2 = (\overline{AC})^2 + (\overline{AB})^2$

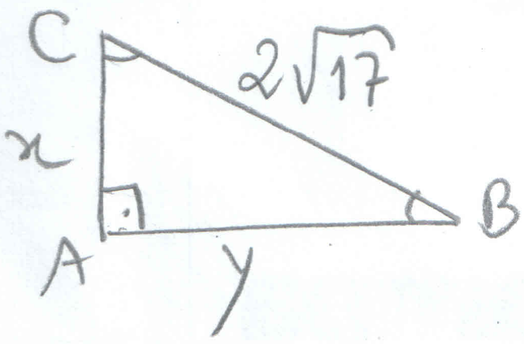
$50^2 = 40^2 + y^2$

$2500 = 1600 + y^2$

$2500 - 1600 = y^2$

$y = \sqrt{900} \Rightarrow y = 30$

Q.5:



$\cos\hat{B} = \frac{2\sqrt{51}}{17}$

$\cos\hat{B} = \frac{y}{2\sqrt{17}} \cdot \frac{\sqrt{17}}{\sqrt{17}} = \frac{y\sqrt{17}}{2.17} = \frac{y\sqrt{17}}{34}$

$\Rightarrow \frac{2\sqrt{51}}{17} = \frac{y\sqrt{17}}{34}$ ②

$\frac{2\sqrt{51}.\cancel{34}^{2}}{\cancel{17}.\sqrt{17}} = y$

$51 = 17.3$

$51.17 = (17.3).17 = 17^2.3$

$(\overline{CB})^2 = (\overline{AC})^2 + (\overline{AB})^2$

$(2\sqrt{17})^2 = x^2 + (4\sqrt{3})^2$

$4.17 = x^2 + 16.3$

$68 - 48 = x^2$

$x = \sqrt{20}$

$x = \sqrt{2^2.5}$

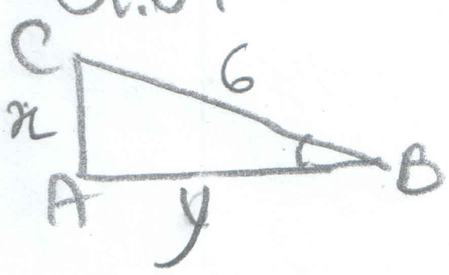
$x = 4\sqrt{5}$

$y = \frac{4\sqrt{51}}{\sqrt{17}} \cdot \frac{\sqrt{17}}{\sqrt{17}}$

$y = \frac{4\sqrt{3.17^2}}{17}$

$y = \frac{4.\cancel{17}\sqrt{3}}{\cancel{17}} = 4\sqrt{3}$

Q.6:



$tg\hat{B} = \frac{\sqrt{5}}{2}$

$tg\hat{B} = \frac{c.o}{c.a} = \frac{x}{y}$

$\frac{x}{y} = \frac{\sqrt{5}}{2} \Rightarrow x = \frac{\sqrt{5}y}{2}$

$24 = 8.3 = 2^2.2.3 = 2^2.6$

$(\overline{CB})^2 = (\overline{AC})^2 + (AB)^2$

$6^2 = \left(\frac{\sqrt{5}y}{2}\right)^2 + y^2$

$\frac{36}{1} = \frac{5y^2}{4} + \frac{y^2}{1}$

$\frac{144 = 5y^2 + y^2}{4}$

$144 = 6y^2$

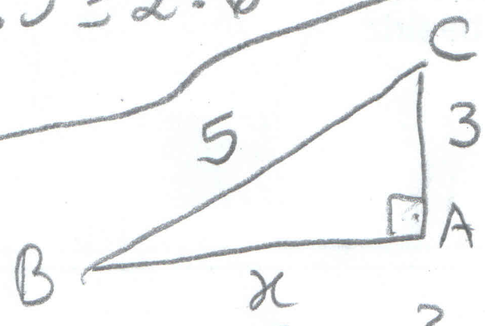
$y^2 = \frac{144}{6}$

$y = \sqrt{24}$

$y = \sqrt{2^2.6}$

$y = 2\sqrt{6}$

Q.7:



a) $sen\hat{B} = \frac{3}{5}$

$sen\hat{B} = \frac{co}{hip.}$

$5^2 = 3^2 + x^2$

$25 - 9 = x^2$

$x = \sqrt{16}$

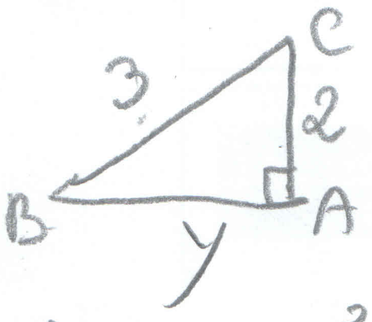
$x = 4$

$\cos\hat{B} = \frac{4}{5}$

$tg\hat{B} = \frac{3}{4}$

$cotg\hat{B} = \frac{4}{3}$

b) $sen\hat{B} = \frac{2}{3}$



$\cos\hat{B} = \frac{\sqrt{5}}{3}$

$tg\hat{B} = \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

$cotg\hat{B} = \frac{\sqrt{5}}{2}$

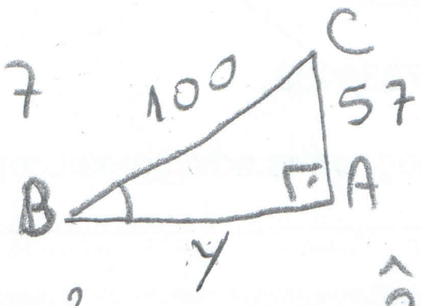
$3^2 = 2^2 + y^2$

$9 - 4 = y^2$

$y^2 = 5$

$y = \sqrt{5}$

c) $sen\hat{B} = 0{,}57$



$sen\hat{B} = \frac{57}{100}$

$(100)^2 = (57)^2 + y^2$

$10000 = 3249 + y^2$

$10000 - 3249 = y^2$

$y^2 = 6751$

$y = \sqrt{6751}$

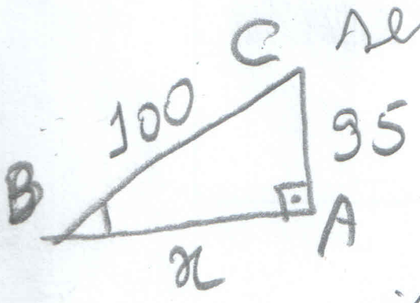
$y \approx 82{,}16$

$\cos\hat{B} = \frac{82{,}16}{100} = 0{,}8216$

$tg\hat{B} = \frac{57}{82{,}16} \approx 0{,}6938$

$cotg\hat{B} = \frac{82{,}16}{57} \approx 1{,}4414$

Q.7: d) $\text{sen}\,\hat{B} = 0{,}95$



$\text{sen}\,\hat{B} = \frac{95}{100}$

$\text{cotg}\,\hat{B} = \frac{5\sqrt{51}}{95} = \frac{\sqrt{51}}{19}$ (÷5)

$(100)^2 = (95)^2 + x^2$

$10000 = 9025 + x^2$

$10000 - 9025 = x^2$

$x = \sqrt{975}$

$x = \sqrt{5^2 \cdot 3 \cdot 17}$

$x = 5\sqrt{51}$

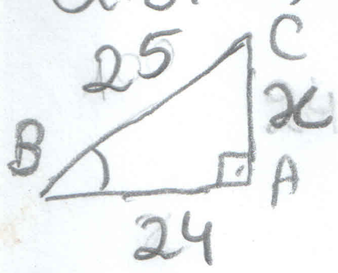
$\cos\hat{B} = \frac{5\sqrt{51}}{100}$ (÷5)

$\cos\hat{B} = \frac{\sqrt{51}}{20}$

$\text{tg}\,\hat{B} = \frac{95}{5\sqrt{51}} \cdot \frac{\sqrt{51}}{\sqrt{51}} = \frac{19\sqrt{51}}{51}$ (÷5)

975	3
325	5
85	5
17	17
1	

Q.8: a) $\cos\hat{B} = 0{,}96$



$\cos\hat{B} = \frac{96}{100} = \frac{24}{25}$ (÷4)

$(25)^2 = (24)^2 + x^2$

$625 = 576 + x^2$

$625 - 576 = x^2$

$x = \sqrt{49}$

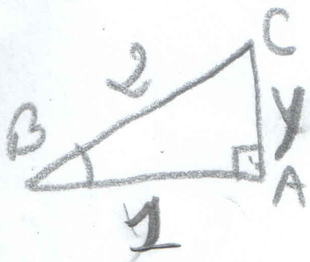
$x = 7$

$\text{sen}\,\hat{B} = \frac{7}{25}$

$\text{tg}\,\hat{B} = \frac{24}{7}$

$\text{cotg}\,\hat{B} = \frac{7}{24}$

b) $\cos\hat{B} = \frac{1}{2}$



$2^2 = 1^2 + y^2$

$4 - 1 = y^2$

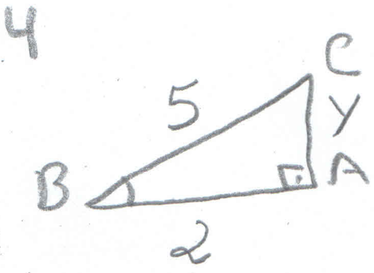
$y = \sqrt{3}$

$\text{sen}\,\hat{B} = \frac{\sqrt{3}}{2}$

$\text{tg}\,\hat{B} = \frac{\sqrt{3}}{1} = \sqrt{3}$

$\text{cotg}\,\hat{B} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

c) $\cos\hat{B} = \frac{2}{5}$



$5^2 = 2^2 + y^2$

$25 - 16 = y^2$

$y = \sqrt{9}$

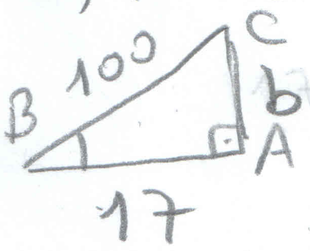
$y = 3$

$\text{sen}\,\hat{B} = \frac{3}{5}$

$\text{tg}\,\hat{B} = \frac{3}{2}$

$\text{cotg}\,\hat{B} = \frac{2}{3}$

d) $\cos\hat{B} = 0{,}17 \Rightarrow \cos\hat{B} = \frac{17}{100}$



$(100)^2 = (17)^2 + b^2$

$10000 = 289 + b^2$

$10000 - 289 = b^2$

$b = \sqrt{9711}$

$b \approx 98{,}5$

9711	3
3237	3
1079	

$\text{sen}\,\hat{B} = \frac{98{,}5}{100} = 0{,}985$

$\text{tg}\,\hat{B} = \frac{17}{98{,}5} \approx 0{,}173$

$\text{cotg}\,\hat{B} = \frac{98{,}5}{17} \approx 5{,}79$

Q.9: $\text{sen}^2\hat{B} + \cos^2\hat{B} = 1$

a) $\text{sen}\,\hat{B} = 0{,}34$

$\text{sen}^2\hat{B} + \cos^2\hat{B} = 1$

$(0{,}34)^2 + x^2 = 1$

$0{,}1156 + x^2 = 1$

$x^2 = 1 - 0{,}1156$

$x = \sqrt{0{,}8844}$

$\cos\hat{B} = x \Rightarrow \cos\hat{B} \approx 0{,}9404$

$x \approx 0{,}9404$

$\text{tg}\,\hat{B} = \frac{\text{sen}\,\hat{B}}{\cos\hat{B}} = \frac{0{,}34}{0{,}9404} \approx 0{,}3615$

$\text{cotg}\,\hat{B} = \frac{\cos\hat{B}}{\text{sen}\,\hat{B}} = \frac{0{,}9404}{0{,}34} \approx 2{,}7659$

$\text{sen}\,\hat{C} \approx 0{,}9404$

$\text{tg}\,\hat{C} \approx 2{,}7659$

$\text{cotg}\,\hat{C} \approx 0{,}3615$

Q.9: b) $\operatorname{sen}\hat{B} = \frac{4}{5}$ $\quad \cos\hat{B} = x$

$\cos\hat{B} = \frac{3}{5}$

$\operatorname{sen}^2\hat{B} + \cos^2\hat{B} = 1$

$\left(\frac{4}{5}\right)^2 + x^2 = 1$

$\frac{16}{25} + x^2 = 1$

$x^2 = 1 - \frac{16}{25}$

$x^2 = \frac{25-16}{25}$

$x = \sqrt{\frac{9}{25}}$

$x = \frac{3}{5}$

$\operatorname{tg}\hat{B} = \frac{4/5}{3/5} = \frac{4}{\cancel{5}} \cdot \frac{\cancel{5}}{3} = \frac{4}{3}$

$\operatorname{cotg}\hat{B} = \frac{3/5}{4/5} = \frac{3}{\cancel{5}} \cdot \frac{\cancel{5}}{4} = \frac{3}{4}$

$\cos\hat{C} = \frac{4}{5}$

$\operatorname{tg}\hat{C} = \frac{3}{4}$ $\quad \operatorname{cotg}\hat{C} = \frac{4}{3}$

c) $\operatorname{sen}\hat{B} = \frac{2}{3}$ $\quad \cos\hat{B} = y$

$\operatorname{sen}^2\hat{B} + \cos^2\hat{B} = 1$

$\left(\frac{2}{3}\right)^2 + y^2 = 1$

$\frac{4}{9} + y^2 = 1$

$y^2 = 1 - \frac{4}{9}$

$y^2 = \frac{9-4}{9}$

$y = \sqrt{\frac{5}{9}}$

$y = \frac{\sqrt{5}}{3}$

$\cos\hat{B} = \frac{\sqrt{5}}{3}$

$\operatorname{tg}\hat{B} = \frac{2/3}{\sqrt{5}/3} = \frac{2}{\cancel{3}} \cdot \frac{\cancel{3}}{\sqrt{5}} = \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

$\operatorname{cotg}\hat{B} = \frac{\sqrt{5}/3}{2/3} = \frac{\sqrt{5}}{\cancel{3}} \cdot \frac{\cancel{3}}{2} = \frac{\sqrt{5}}{2}$

$\cos\hat{C} = \frac{2}{3}$

$\operatorname{tg}\hat{C} = \frac{\sqrt{5}}{2}$ $\quad \operatorname{cotg}\hat{C} = \frac{2\sqrt{5}}{5}$

d) $\operatorname{sen}\hat{B} = 0{,}9 \Rightarrow \operatorname{sen}\hat{B} = \frac{9}{10}$

$\operatorname{sen}^2\hat{B} + \cos^2\hat{B} = 1$ $\quad \cos\hat{B} = x$

$\left(\frac{9}{10}\right)^2 + x^2 = 1$ $\quad \cos\hat{B} = \frac{\sqrt{19}}{10}$

$\frac{81}{100} + x^2 = 1$

$x^2 = 1 - \frac{81}{100}$

$x^2 = \frac{100-81}{100}$

$x = \sqrt{\frac{19}{100}} \Rightarrow x = \frac{\sqrt{19}}{10}$

$\operatorname{tg}\hat{B} = \frac{9/10}{\sqrt{19}/10} = \frac{9}{\cancel{10}} \cdot \frac{\cancel{10}}{\sqrt{19}} = \frac{9}{\sqrt{19}} \cdot \frac{\sqrt{19}}{\sqrt{19}} = \frac{9\sqrt{19}}{19}$

$\operatorname{cotg}\hat{B} = \frac{\sqrt{19}/10}{9/10} = \frac{\sqrt{19}}{\cancel{10}} \cdot \frac{\cancel{10}}{9} = \frac{\sqrt{19}}{9}$

$\operatorname{sen}\hat{C} = \frac{\sqrt{19}}{10}$ $\quad \operatorname{tg}\hat{C} = \frac{\sqrt{19}}{9}$ $\quad \operatorname{cotg}\hat{C} = \frac{9\sqrt{19}}{19}$

Q.10:

a) $\cos\hat{B} = 0{,}57$ $\quad \operatorname{sen}\hat{B} = x \Rightarrow \operatorname{sen}\hat{B} \approx 0{,}8216$

$\operatorname{sen}^2\hat{B} + \cos^2\hat{B} = 1$ $\quad \operatorname{tg}\hat{C} = \operatorname{cotg}\hat{B} = \frac{\cos\hat{B}}{\operatorname{sen}\hat{B}}$ $\quad \cos\hat{C} = \operatorname{sen}\hat{B} \approx 0{,}8216$

$x^2 + (0{,}57)^2 = 1$

$x^2 + 0{,}3249 = 1$

$x^2 = 1 - 0{,}3249$

$x = \sqrt{0{,}6751}$

$x \approx 0{,}8216$

$\operatorname{tg}\hat{C} = \frac{0{,}57}{0{,}8216}$

$\operatorname{cotg}\hat{C} = \operatorname{tg}\hat{B} = \frac{\operatorname{sen}\hat{B}}{\cos\hat{B}}$

$\operatorname{cotg}\hat{C} = \frac{0{,}8216}{0{,}57} \approx 1{,}4414$

Q.10:

b) $\cos\hat{B} = \frac{3}{5}$ $\quad \operatorname{sen}\hat{B} = x \Rightarrow \operatorname{sen}\hat{B} = \frac{4}{5}$

$\operatorname{sen}^2\hat{B} + \cos^2\hat{B} = 1$

$x^2 + \left(\frac{3}{5}\right)^2 = 1$

$x^2 = 1 - \frac{9}{25}$

$x^2 = \frac{25-9}{25}$

$x = \sqrt{\frac{16}{25}} \Rightarrow x = \frac{4}{5}$

$\cos\hat{C} = \operatorname{sen}\hat{B} = \frac{4}{5}$

$\operatorname{tg}\hat{C} = \operatorname{cotg}\hat{B} = \frac{\cos\hat{B}}{\operatorname{sen}\hat{B}}$

$\operatorname{tg}\hat{C} = \frac{3/5}{4/5} = \frac{3}{\cancel{5}} \cdot \frac{\cancel{5}}{4} = \frac{3}{4}$

$\operatorname{cotg}\hat{C} = \frac{4/5}{3/5} = \frac{4}{\cancel{5}} \cdot \frac{\cancel{5}}{3} = \frac{4}{3}$

c) $\cos\hat{B} = \frac{5}{6}$ $\quad \operatorname{sen}\hat{B} = x$

$\operatorname{sen}^2\hat{B} + \cos^2\hat{B} = 1$ $\quad \operatorname{sen}\hat{B} = \frac{\sqrt{11}}{6}$

$x^2 + \left(\frac{5}{6}\right)^2 = 1$

$x^2 = 1 - \frac{25}{36}$

$x^2 = \frac{36-25}{36}$

$x = \sqrt{\frac{11}{36}}$

$x = \frac{\sqrt{11}}{6}$

$\cos\hat{C} = \frac{\sqrt{11}}{6}$

$\operatorname{tg}\hat{C} = \frac{5/6}{\sqrt{11}/6} =$

$\operatorname{tg}\hat{C} = \frac{5}{\cancel{6}} \cdot \frac{\cancel{6}}{\sqrt{11}} = \frac{5}{\sqrt{11}}$

$\operatorname{tg}\hat{C} = \frac{5}{\sqrt{11}} \cdot \frac{\sqrt{11}}{\sqrt{11}} = \frac{5\sqrt{11}}{11}$

$\operatorname{cotg}\hat{C} = \frac{\sqrt{11}/6}{5/6} = \frac{\sqrt{11}}{\cancel{6}} \cdot \frac{\cancel{6}}{5} = \frac{\sqrt{11}}{5}$

d) $\cos\hat{B} = 0{,}7 \Rightarrow \operatorname{sen}\hat{B} = x$

$\operatorname{sen}^2\hat{B} + \cos^2\hat{B} = 1$

$x^2 + (0{,}7)^2 = 1$

$x^2 + 0{,}49 = 1$

$x = \sqrt{1 - 0{,}49}$

$x = \sqrt{0{,}51}$

$x \approx 0{,}714$

$\operatorname{sen}\hat{B} \approx 0{,}714$

$\cos\hat{C} \approx 0{,}714$

$\operatorname{tg}\hat{C} = \frac{0{,}7}{0{,}714}$

$\operatorname{cotg}\hat{C} = \frac{0{,}714}{0{,}7}$

Q.11:

a) $\cos 30° \approx 0{,}866025$

b) $\operatorname{sen} 45° \approx 0{,}707107$

c) $\operatorname{tg} 60° \approx 1{,}732051$

d) $\operatorname{sen} 15° \approx 0{,}258819$

e) $\cos 45° \approx 0{,}707107$

f) $\operatorname{tg} 30° \approx 0{,}577350$

g) $\operatorname{sen} 75° \approx 0{,}965926$

h) $\cos 89° \approx 0{,}017452$

Q.12:

a) $\operatorname{sen}\hat{A} = 0{,}51504$

$\hat{A} = \operatorname{arc\,sen}(0{,}51504) \Rightarrow \hat{A} \approx 31°$

b) $\cos\hat{B} = 0{,}76604$

$\hat{B} = \operatorname{arc\,cos}(0{,}76604) \Rightarrow \hat{B} \approx 40°$

c) $\operatorname{tg}\hat{C} = 4{,}331148$

$\hat{C} = \operatorname{arc\,tg}(4{,}331148) \Rightarrow \hat{C} \approx 77°$

d) $\operatorname{sen}\hat{D} = 0{,}86603 \Rightarrow \hat{D} = \operatorname{arc\,sen}(0{,}86603)$

$\hat{D} \approx 60°$

e) $\cos\hat{E} = 0{,}57358$

$\hat{E} = \operatorname{arc\,cos}(0{,}57358) \Rightarrow \hat{E} \approx 55°$

f) $\operatorname{tg}\hat{F} = 0{,}17633 \Rightarrow \hat{F} = \operatorname{arc\,tg}(0{,}17633)$

$\hat{F} \approx 10°$

g) $\operatorname{sen}\hat{G} = 0{,}01745 \Rightarrow \hat{G} = \operatorname{arc\,sen}(0{,}01745)$

$\hat{G} \approx 1°$

h) $\cos\hat{H} = 0{,}08716 \Rightarrow \hat{H} = \operatorname{arc\,cos}(0{,}08716)$

$\hat{H} = 85°$