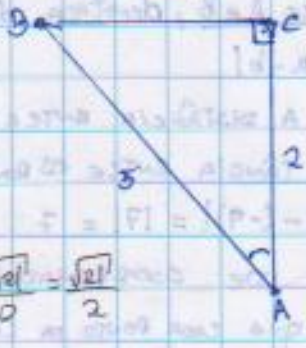
03/09/2018

Kwitiko Kodaira - Mathematics 1 - p 218

Problem 1: Find sin A and tan A for right triangle ABC, if $\cos A = \frac{2}{5}$



$\sin^2(A) = 1 - \left(\frac{2}{5}\right)^2 = \frac{25}{25} - \frac{4}{25}$

$\sin(A) = \sqrt{\frac{21}{25}} = \frac{\sqrt{21}}{5}$

$\tan(A) = \frac{\sin(A)}{\cos(A)} = \frac{\frac{\sqrt{21}}{5}}{\frac{2}{5}} = \frac{5\sqrt{21}}{2 \cdot 5} = \frac{5\sqrt{21}}{10} = \frac{\sqrt{21}}{2}$

Problem 2: Prove the following equality: $1 + \tan^2 A = \frac{1}{\cos^2 A}$

$\sin B = \frac{b}{c}$, $\cos A = \frac{b}{c}$

Since $B = 90° - A$,

$\sin(90° - A) = \cos A$ (1)

Analogously,

$\cos(90° - A) = \sin A$ (2)

$\tan^2 A + 1 = \frac{1}{\cos^2 A} = \frac{1}{\frac{4}{25}} \rightarrow \tan^2 A = \frac{\frac{25}{25}}{\frac{4}{25}} - 1 = \frac{100}{625} - 1$

$\tan A = \sqrt{\frac{-525}{625}}$ $\tan^2 A = \frac{625}{100} - \frac{625}{625} = \frac{0}{-525} = 525$

$\tan A = \sqrt{525}$

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Problem 3: Check that formula (2) holds

$\cos(90° - 66,4218215) = 23,5781785° = 0,91651539$

$\sin(A) = \frac{\sqrt{21}}{5} = 0,91651539 \rightarrow \sin^{-1}(\sin(A)) = 66,4218215$

Problem 4: Prove that the following formula holds:

$\tan(90° - A) = \frac{1}{\tan A}$

$\tan(90 - 66,4218215) = 0,43643578$

$\frac{1}{\tan(A)} = 0,43643578$

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