Answer on Question #81502 – Math – Trigonometry

Question

Find exact value of the expression?
tan a = 24/7, a lies in quadrant 3 and cos B =-15/17, B lies in quadrant 2. Find sin(a+B)

Solution

$\sin(a+B)= \sin(a)* \cos(B)+ \cos(a)* \sin(B)$,

$\tan^2 a= \sin^2(a)/ \cos^2(a)=(1- \cos^2(a)/ \cos^2(a)=1/ \cos^2(a)-1$,

$1/ \cos^2(a)=1+ \tan^2 a$,

$\cos^2(a)=1/(1+ \tan^2 a)=1/(1+24^2/7^2)=1/(625/49)=49/625$;

a lies in quadrant 3, hence $\cos(a)<0$, $\sin(a)<0$,

$\cos(a)= -\sqrt{\frac{49}{625}} =$ -7/25, $\sin^2(a)=1- \cos^2(a)= 576/625$, $\sin(a)= -\sqrt{\frac{576}{625}} =$ -24/25,

$\sin^2(B)=1- \cos^2(B)= 1- 225/289=64/289$,

B lies in quadrant 2, hence $\sin(B)>0$,

$\sin(B)= \sqrt{\frac{64}{289}} = 8/17$,

$\sin(a+B)= \sin(a)* \cos(B)+ \cos(a)* \sin(B)= (-24/25)*(-15/17)+ (-7/25)*(8/17)=$

$= (360-56)/425=304/425$

Answer: 304/425.