If $\cos p = -4/5$ with p in quadrant 3, and $\cos q = 5/13$ with q in quadrant 4, find $\tan(p-q)$

a. 1
b. -63/16
c. 63/16
d. - 33/16

Solution.

$\tan(\mathrm{p}-\mathrm{q}) = \frac{\tan p - \tan q}{1+\tan p \cdot \tan q}$

$\tan p = \frac{\sin p}{\cos p}$, $\tan q = \frac{\sin q}{\cos q}$

$\sin^2 p + \cos^2 p = 1$,

because p is in quadrant 3 $\sin p = -\sqrt{1-\cos^2 p}$, $\sin p = -\sqrt{1-\frac{16}{25}} = -\sqrt{\frac{9}{25}} = -\frac{3}{5}$.

$\sin^2 q + \cos^2 q = 1$,

because q is in quadrant 4 $\sin q = -\sqrt{1-\cos^2 q}$, $\sin p = -\sqrt{1-\frac{25}{169}} = -\sqrt{\frac{144}{169}} = -\frac{12}{13}$.

$\tan p = -\frac{3}{5} \div (-\frac{4}{5}) = \frac{3}{4}$.

$\tan q = -\frac{12}{13} \div \frac{5}{13} = -\frac{12}{5}$.

$\tan(\mathrm{p}-\mathrm{q}) = \frac{\frac{3}{4}+\frac{12}{5}}{1-\frac{3}{4}\cdot\frac{12}{5}} = -\frac{63}{16}$.

Answer.

b. -63/16