Answer on Question#31412 – Math – Trigonometry

Condition of the problem:

What is the exact value of $4\cos(540°) + 3\,\mathrm{tg}(-405°)$?

Solution:

It is known that

$$540° = 3\pi,$$

$$\cos(540°) = \cos(3\pi) = -1.$$

It is known that

$$405° = 360° + 45°,$$

Using next formulas to calculate the $\mathrm{tg}(-405°)$:

$\mathrm{tg}(x) = \frac{\sin(x)}{\cos(x)}$,

$\sin(-x) = -\sin(x), \quad \cos(-x) = \cos(x),$

$\sin(x+y) = \sin(x)\cos(y) + \sin(y)\cos(x)$,

$\cos(x+y) = \cos(x)\cos(y) - \sin(x)\sin(y)$,

$\sin(360°) = 0,\ \cos(360°) = 1,$

$\sin(45°) = \frac{\sqrt{2}}{2}, \quad \cos(45°) = \frac{\sqrt{2}}{2}.$

$$\mathrm{tg}(-405°) = \frac{\sin(-405°)}{\cos(-405°)} = \frac{-\sin(405°)}{\cos(405°)} = \frac{-\sin(360° + 45°)}{\cos(360° + 45°)} =$$

$$= \frac{-\sin(360°)\cos(45°) - \sin(45°)\cos(360°)}{\cos(360°)\cos(45°) - \sin(45°)\sin(360°)} = \frac{-\sin(45°)}{\cos(45°)} = \frac{-\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = -1.$$

Conclusion:

$$4\cos(540°) + 3\,\mathrm{tg}(-405°) = 4 \cdot (-1) + 3 \cdot (-1) = -7.$$

Answer: -7.