

**Формулы
двойного
аргумента**



А.А.

арков

**Не бойтесь
формул!
Учитесь владеть
ЭТИМ
инструментом
человеческого
гения!**

**В формулах
заключено
величие и**

Тригонометрические

формулы

$$ctgx = \frac{\cos x}{\sin x}$$

$$\sin\left(\frac{\pi}{2} + x\right) = \cos x$$

$$1 + tg^2 x = \frac{1}{\cos^2 x}$$

$$\cos(2\pi - x) = \cos x$$

$$1 = \sin^2 x + \cos^2 x$$

$$ctg\left(\frac{3\pi}{2} + x\right) = -tgx$$

$$1 = tgxctgx$$

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

Задач

Дано:

$$\cos \alpha = \frac{4}{5}$$

$$\frac{3\pi}{2} < \alpha < 2\pi$$

Найти

$\sin \alpha$

$$\sin\left(\frac{\pi}{3} + \alpha\right)$$

$$\sin 2\alpha$$

а Решени

e:

$$\sin \alpha = -\frac{3}{5}$$

$$\sin 2\alpha = \sin(\alpha + \alpha) =$$

$$= \sin \alpha \cos \alpha + \cos \alpha \sin \alpha =$$

$$= 2 \sin \alpha \cos \alpha$$

$$\sin 2\alpha = -\frac{24}{25}$$

$$\begin{aligned}
 \text{XXXXXXXXXX} &= \text{XXXXXXXX} + \text{XX} = \\
 &= \text{XXXXXXXX} \text{XXXXXXXX} - \text{XXXXXXXX} \text{XXXXXXXX}
 \end{aligned}$$

$$\text{XXXXXXXXXX} = \text{XXXXXXXX} \text{X} \text{XX} - \text{XXXXXXXX} \text{X} \text{XX}$$

$$\text{XXXXXXXX} = \text{XXXXXX} + \text{XX} = \frac{\text{XXXXXX} + \text{XXXXXX}}{\text{X} - \text{XXXXXXXXXX}}$$

$$\text{XXXXXXXX} = \frac{\text{XXXXXXXX}}{\text{X} - \text{XXXXXX} \text{X} \text{XX}}$$

Формулы двойного аргумента

$$\sin 2\alpha = 2\sin\alpha\cos\alpha$$

$$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

$$\operatorname{tg} 2\alpha = \frac{2\operatorname{tg}\alpha}{1 - \operatorname{tg}^2\alpha}$$

Упростите выражение

$$\frac{\begin{array}{|c|c|} \hline \text{XXXXXX} & \text{XXXX} \\ \hline \end{array}}{\begin{array}{|c|c|c|} \hline \text{XXXXXX} & \text{XX} & \\ \hline \end{array}} - \begin{array}{|c|c|} \hline \text{XXXXXX} & \text{XX} \\ \hline \end{array}$$

Решени

е:

$$\frac{\begin{array}{|c|c|} \hline \text{XXXXXX} & \text{XXXX} \\ \hline \end{array}}{\begin{array}{|c|c|c|} \hline \text{XXXXXX} & \text{XX} & \\ \hline \end{array}} - \begin{array}{|c|c|} \hline \text{XXXXXX} & \text{XX} \\ \hline \end{array} = \frac{\begin{array}{|c|c|c|c|c|c|} \hline \text{XXXXXX} & \text{XXXXXX} & \text{XXXXXX} & \text{XXXXXX} & \text{XXXXXX} & \text{XXXXXX} \\ \hline \end{array}}{\begin{array}{|c|c|c|} \hline \text{XXXXXX} & \text{XX} & \\ \hline \end{array}} - \begin{array}{|c|c|} \hline \text{XXXXXX} & \text{XX} \\ \hline \end{array} =$$
$$= \begin{array}{|c|c|} \hline \text{XXXXXX} & \text{XX} \\ \hline \end{array}$$

Упростите

выражение

$$\frac{10x^2 + 10x + 1}{x^2 + 2x + 1} + \frac{10x^2 + 10x + 1}{x^2 + 2x + 1}$$

Решени

е:

$$\frac{10x^2 + 10x + 1}{x^2 + 2x + 1} + \frac{10x^2 + 10x + 1}{x^2 + 2x + 1} = \frac{10x^2 + 10x + 1}{x^2 + 2x + 1} - \frac{10x^2 + 10x + 1}{x^2 + 2x + 1} =$$

$$= \frac{(10x^2 + 10x + 1) + (10x^2 + 10x + 1)}{x^2 + 2x + 1} (10x^2 + 10x + 1 - 10x^2 - 10x - 1)$$

Отве

$$10x^2 + 10x + 1 - 10x^2 - 10x - 1$$

т:

Проверк

а

| | |
|--|----------------------|
| 1 задание | |
| $2\sin \frac{\pi}{12} \cos \frac{\pi}{12}$ | 0,5 |
| $\cos^2 15^\circ - \sin^2 15^\circ$ | $\frac{\sqrt{3}}{2}$ |
| $2\sin 75^\circ \cos 75^\circ$ | 0,5 |

Проверк

а

| 2 задание | 3 задание |
|-----------------|-----------------------|
| $\sin^2 \alpha$ | $-\frac{\sqrt{3}}{2}$ |
| -1 | |

Косинус двойного аргумента

$$\cos(2\alpha) = \cos^2 \alpha - \sin^2 \alpha$$

$$\cos(2\alpha) = 2\cos^2 \alpha - 1$$

$$\cos(2\alpha) = 1 - 2\sin^2 \alpha$$

Докажете

ТОЖДЕСТВО

$$\frac{\text{XXXXXX} + \text{XX} - \text{XXXXXX}}{\text{XXXXXX} \left(\frac{\text{XX}}{\text{XX}} + \text{XXXX} \right)} = - \frac{\text{XX}}{\text{XX}} \text{XXXXXX}$$

$$\frac{\text{XXXXXX} + \text{XX} - \text{XXXXXX}}{\text{XXXXXX} \left(\frac{\text{XX}}{\text{XX}} + \text{XXXX} \right)} = \frac{\text{XXXXXX} - \text{XX} + \text{XX} - \text{XXXXXX}}{- \text{XXXXXX}} =$$

$$= \frac{\text{XXXXXX}}{- \text{XXXXXX}} = - \frac{\text{XX}}{\text{XX}} \text{XXXXXX}$$

$$- \frac{\text{XX}}{\text{XX}} \text{XXXXXX} = - \frac{\text{XX}}{\text{XX}} \text{XXXXXX}$$

