Double-angle identities and derived forms

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. If $\cos x = \frac{3}{5}$, calculate $\cos 2x$. [2 marks]

$2(\frac{9}{25}) - 1 = -\frac{7}{25}$.

Answer: $-\frac{7}{25}$.

2. If $\tan x = \frac{1}{2}$, calculate $\tan 2x$. [2 marks]

$\frac{2(\frac{1}{2})}{1-\frac{1}{4}} = \frac{4}{3}$.

Answer: $\frac{4}{3}$.

3. Rewrite $\cos^2(3x)$ using a multiple-angle cosine. [2 marks]

Apply the square identity with angle $3x$.

Answer: $\frac{1+\cos 6x}{2}$.

4. Find $\cos(\frac{\pi}{8})$ exactly. [2 marks]

Use $\frac{1+\cos(\frac{\pi}{4})}{2}$ for its square, then the positive root.

Answer: $\frac{\sqrt{2+\sqrt{2}}}{2}$.

5. Solve $\cos 2x = 1$ on $[0, 2\pi)$. [2 marks]

$2x = 2k\pi$ gives $x = k\pi$.

Answer: $x = 0, \pi$.

6. For x in quadrant II with $\sin x = \frac{3}{5}$, find $\sin 2x$. [2 marks]

Cosine is $-\frac{4}{5}$; multiply $2(\frac{3}{5})(-\frac{4}{5})$.

Answer: $-\frac{24}{25}$.