Double-angle identities and derived forms

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

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

$2(9/25) - 1 = -7/25$.

Answer: $-7/25$.

2. If $\tan x = 1/2$, calculate $\tan 2x$. [2 marks]

$2(1/2)/(1 - 1/4) = 4/3$.

Answer: $4/3$.

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

Apply the square identity with angle $3x$.

Answer: $(1 + \cos 6x)/2$.

4. Find $\cos(\pi/8)$ exactly. [2 marks]

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

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

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 $\sin x = 3/5$, find $\sin 2x$. [2 marks]

Cosine is $-4/5$; multiply $2(3/5)(-4/5)$.

Answer: $-24/25$.