

# AEA 2002

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### Question 1

$$\begin{aligned}
 &= \sin 5x \\
 &= \sin 2x \cos 3x + \sin 3x \cos 2x \\
 &= 2 \sin x \cos x \cos 3x + \sin 3x (\cos^2 x - \sin^2 x) \\
 &= 2 \sin x \cos x (\cos x \cos 2x - \sin x \sin 2x) + (\sin 2x \cos x + \sin x \cos 2x) (\cos^2 x - \sin^2 x) \\
 &= 2 \sin x \cos x (\cos x (\cos^2 x - \sin^2 x) - 2 \sin^2 x \cos x) + (2 \sin x \cos^2 x + \sin x (\cos^2 x - \sin^2 x)) (\cos^2 x - \sin^2 x) \\
 &= 2 \sin x \cos x (\cos^3 x - \sin^2 x \cos x - 2 \sin^2 x \cos x) + (2 \sin \cos^2 x + \sin x \cos^2 x - \sin^3 x) (\cos^2 x - \sin^2 x) \\
 &= 2 \sin x \cos x (\cos^3 x - 3 \sin^2 x \cos x) + (3 \sin x \cos^2 x - \sin^3 x) (\cos^2 x - \sin^2 x) \\
 &= 2 \sin x \cos^4 x - 6 \sin^3 x \cos^2 x + 3 \sin x \cos^4 x - \sin^3 x \cos^2 x - 3 \sin^3 \cos^2 x + \sin^5 x \\
 &= 5 \sin x \cos^4 x - 10 \sin^3 x \cos^2 x + \sin^5 x \\
 \\
 &= \cos 5x \\
 &= \cos 3x \cos 2x - \sin 3x \sin 2x \\
 &= (\cos 2x \cos x - \sin 2x \sin x) (\cos^2 x - \sin^2 x) - 2 \sin x \cos x (\sin 2x \cos x + \sin x \cos 2x) \\
 &= ((\cos^2 x - \sin^2 x) \cos x - 2 \sin^2 x \cos x) (\cos^2 x - \sin^2 x) - 2 \sin x \cos x (2 \sin x \cos^2 x + (\cos^2 x - \sin^2 x) \sin x) \\
 &= (\cos^3 x - \sin^2 x \cos x - 2 \sin^2 x \cos x) (\cos^2 x - \sin^2 x) - 2 \sin x \cos x (2 \sin x \cos^2 x + \cos^2 x \sin x - \sin^3 x)
 \end{aligned}$$

### Question 2

TODO

### Question 3

$$\begin{aligned}
 y &= 3 - 2t^2 \\
 t &= \sqrt{\frac{3-y}{2}} \\
 x &= 15t - t^3 \\
 &= 15\sqrt{\frac{3-y}{2}} - \left(\frac{3-y}{2}\right)^{\frac{3}{2}} \\
 &= 15\frac{\sqrt{6-2y}}{2} - ???
 \end{aligned}$$

**Question 4**

$$x^3 + y^3 - 3xy = 48$$

$$y^3 - 3xy = 48 - x^3$$

$$y(y^2 - 3x) = 48 - x^3$$