Ex27: $g(x) = a + bx + cx^2 + o(x^2)$

$$(\sin x)^3 = \left(x - \frac{x^3}{6} + \frac{x^5}{120} + o(x^5)\right)^3 = x^3\left(1 - \frac{x^2}{6} + \frac{x^4}{120} + o(x^4)\right)^3$$

$$= x^3\left(1 - 3\times\frac{x^2}{6} + 3\frac{x^4}{120} + 3\times\frac{x^4}{36} + o(x^4)\right)$$

$$= x^3 - \frac{x^5}{2} + \frac{13}{120}x^7 + o(x^7)$$

$$g(x) = \frac{x - \frac{x^3}{3} + \frac{x^5}{5} + o(x^5)}{x^3 - \frac{x^5}{2} + \frac{13}{120}x^7 + o(x^7)} - \frac{1}{x^2} = \frac{1 - \frac{x^2}{3} + \frac{x^4}{5} + o(x^4)}{x^2 - \frac{x^4}{2} + \frac{13}{120}x^6 + o(x^6)} - \frac{1}{x^2}$$

$$= \frac{1}{x^2} \times \frac{1 - \frac{x^2}{3} + \frac{x^4}{5} + o(x^4)}{1 - \frac{x^2}{2} + \frac{13}{120}x^4 + o(x^4)} - \frac{1}{x^2}$$

$$= \frac{1}{6} + \frac{7}{40}x^2 + o(x^2)$$