

Question #284

Answer: C

Woolhouse's formula to three terms is $\ddot{a}_{80}^{(m)} = \ddot{a}_{80} - \frac{m-1}{2m} - \frac{m^2-1}{12m^2}(\delta + \mu_{80})$. Then,

$$\ddot{a}_{80}^{(2)} - \ddot{a}_{80}^{(4)} = \ddot{a}_{80} - \frac{2-1}{2(2)} - \frac{2^2-1}{12(2)^2}(\delta + \mu_{80}) - \ddot{a}_{80} + \frac{4-1}{2(4)} + \frac{4^2-1}{12(4)^2}(\delta + \mu_{80})$$

$$8.29340 - 8.16715 = -(1/4) + (3/8) - [(3/48) - (15/192)](\delta + \mu_{80})$$

$$0.00125 = 0.015625(\delta + \mu_{80})$$

$$\delta + \mu_{80} = 0.08$$

$$\ddot{a}_{80} = \ddot{a}_{80}^{(2)} + 1/4 + (3/48)(0.08) = 8.5484.$$

The answer is:

$$\ddot{a}_{80}^{(12)} = \ddot{a}_{80} - \frac{12-1}{2(12)} - \frac{12^2-1}{12(12)^2}(\delta + \mu_{80}) = 8.54840 - \frac{11}{24} - \frac{143}{1728}(0.08) = 8.08345.$$