$$C_{33} = \frac{C_{33}^{element}}{\det(b)} = \frac{1}{\det(b)} \cdot \frac{\sigma^2 \, Var(x)}{N} = \frac{\sigma^2 \, (\Delta x)^2}{12 N} \cdot \frac{1}{\det(b)}$$

And before, we found

$$\det(b) = (\Delta x)^6 / 2160 ,$$

So

$$C_{33} = \frac{\sigma^2}{N (\Delta x)^4} \cdot \frac{\cancel{2160}^{180}}{\cancel{12}} = (\sigma(a_3))^2$$

$$\sigma(a_3) = 6\sqrt{5} \cdot \frac{\sigma}{N^{1/2} (\Delta x)^2}$$

If you presume $N \sim \tau$, and clearly $\Delta x \sim \tau$, then

$$\boxed{\sigma(a_3) \sim \tau^{-5/2}}$$