1. Use the formula $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$ to compute $\sum_{3}^{17} k^2$.

Solution.

$$\sum_{3}^{17} k^2 = \frac{17(18)(35)}{6} - \frac{2(3)(5)}{6}$$

$$[= 35 \cdot 51 - 5 = 1780]$$

2. Estimate the area under the curve $y = x^3$ between $x = 0$ and $x = 1$ by subdividing the interval $[0, 1]$ into four equal sub-intervals and using the midpoint rule. Do not simplify your result!

Solution. Since $N = 4$, $\Delta x = 1/4$.

$x_0 = 0$, $x_1 = \frac{1}{4}$, $x_2 = \frac{2}{4}$, $x_3 = \frac{3}{4}$, $x_4 = \frac{4}{4}$.

Hence,

$$M(f) = \frac{1}{2^2} \left[ \frac{1}{2^9} + \frac{27}{2^9} + \frac{125}{2^9} + \frac{343}{2^9} \right] = \left( \frac{1}{2048} \right) [344 + 152] = \frac{496}{2048} = \frac{31}{128}.$$