

(1)[5 points] To find  $\int_0^2 x^2 dx$  using the definition of the definite integral, we obtain

$$\int_0^2 x^2 dx = \lim_{n \rightarrow \infty} S_n$$

where

$$S_n = \sum_{k=1}^n \left(\frac{2k}{n}\right)^2 \left(\frac{2}{n}\right).$$

Simplify this expression for  $S_n$  and then determine  $\lim_{n \rightarrow \infty} S_n$ . Recall that

$$\sum_{k=1}^n k = \frac{n(n+1)}{2} \quad \text{and} \quad \sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$$

(2)[5 points] Evaluate

$$\int_{1/2}^3 \frac{1}{x^2} dx$$

(3)[5 points] Evaluate

$$\int_0^2 x^2 e^{x^3} dx$$