1) Find the indefinite integral below.

$$\int \cos(4x)\, dx$$

2) Find the definite integral below.

$$\int_1^2 4x^3\, dx$$

3) The expression below is supposed to give the area under $y = x^2$ between $x = 2$ and $x = 5$. Fill in the missing piece.

$$\lim_{n \to \infty} \sum_{k=1}^{n} \boxed{} \cdot \left(2 + k\frac{3}{n}\right)^2$$