1. Evaluate the following integrals.

   (a) $\int_1^4 x^3 - 2x \, dx$

   (b) $\int_{-1}^2 e^x \, dx$

   (c) $\int_1^3 2x \cos(x^2) \, dx$

   (d) $\int_1^3 3x^2 \ln(x) + x^3 \left(\frac{1}{x}\right) \, dx$

   (e) $\int_0^1 \sin(x^2) \, dx$

2. Find $F'(x)$ for each function.

   $$(a) \; F(x) = \int_1^x t \, \sin(2t) \, dt \qquad (b) \; F(x) = \int_1^{x^3} \ln(3 + 2t) \, dt$$

3. Find the area of the region that is above the graph of $y = 2x^2$ and below the graph of $y = -5x + 3$.