1. Use symmetry to evaluate these integrals
   (a) \( \int_{-\pi/4}^{\pi/4} \cos x \, dx \)
   (b) \( \int_{-10}^{10} \frac{x}{\sqrt{200-x^2}} \, dx \)
   (c) \( \int_{0}^{2\pi} \sin x \, dx \)

2. Find the average value of the following functions on the interval given
   (a) \( f(x) = 1/x; [1,e] \)
   (b) \( f(x) = x(1-x); [0,1] \)

3. Find the appropriate point in the interval where the function equals its average value.
   (a) \( f(x) = e^x; [0,2] \)
   (b) \( f(x) = 1 - |x|; [-1,1] \)

4. Show that the area of a segment of a parabola is \( 4/3 \) that of the inscribed triangle of greatest area. Specifically, show that the area bounded by \( y = a^2 - x^2 \) and the \( x \)-axis is \( 4/3 \) the area of the triangle with vertices at \((\pm a,0)\) and \((0,a^2)\). Let \( a > 0 \) be an arbitrary constant.

5. Use a change of variables (substitution) to find the following integrals
   (a) \( \int 2x(x^2 - 1)^9 \, dx \)
   (b) \( \int x^3(x^4 + 16)^6 \, dx \)
   (c) \( \int 2x \sin(x^2) \, dx \)
   (d) \( \int \frac{x^2}{(x+1)} \, dx \)
   (e) \( \int (x + 1)\sqrt{3x + 2} \, dx \)
   (f) \( \int_0^1 2x(4 - x^2) \, dx \)
   (g) \( \int_0^{\pi/2} \sin^2 \theta \cos \theta \, d\theta \)
   (h) \( \int_0^4 \frac{p}{\sqrt{9+p^2}} \, dp \)