1. Evaluate the following definite integrals
   (a) \( \int_0^2 4x^3 \, dx \)
   (b) \( \int_0^{\pi/4} 2 \cos x \, dx \)
   (c) \( \int_{-2}^{2} (x^2 - 4) \, dx \)
   (d) \( \int_0^{1/2} \frac{dx}{\sqrt{1-x^2}} \)
   (e) \( \int_0^1 10e^{2x} \, dx \)
   (f) \( \int_1^3 \frac{3}{t} \, dt \)

2. Find the area of the region bounded by the \( x \)-axis, and \( y = 4 - x^2 \).

3. Simplify the following expressions using the FTC.
   (a) \( \frac{d}{dx} \int_3^x (t^2 + t + 1) \, dt \)
   (b) \( \frac{d}{dx} \int_2^{10} \frac{dz}{z^2 + 1} \)
   (c) \( \frac{d}{dt} \int_0^e e^{2x} \ln t^2 \, dx \)

4. Evaluate the following definite integrals
   (a) \( \frac{1}{2} \int_0^{\ln 2} e^x \, dx \)
   (b) \( \int_{\sqrt{2}}^2 \frac{dx}{x \sqrt{x^2 - 1}} \)

5. What value of \( b > -1 \) maximizes the integral
   \[ \int_{-1}^b x^2 (3 - x) \, dx \]

6. Suppose \( f \) is a continuous function of \( t \) on \([0, \infty)\) and \( A(x) \) is the net area of the region bounded by the graph of \( f \) and the \( t \)-axis on \([0, x]\). Show that the local maxima and minima of \( A \) occur at the zeroes of \( f \). Verify this with \( f(t) = t^2 - 10t \).