1. Evaluate the following definite integrals:

(a) \( \int_{0}^{4} (t^2 - 2)t \, dt \)

(b) \( \int_{-1}^{1} (x^{1/3} - 4x^{1/5}) \, dx \)

(c) \( \int_{0}^{\pi} \cos^2(x) \sin(x) \, dx \)

(d) \( \int_{0}^{1} \frac{1}{(5 - 3x)^2} \, dx \)
2. Without calculating the integral, find the derivative of $F(x) = \int_1^{2x+5} t^2 \, dt$.

3. Evaluate $\int_{-1}^{2} |1 - x| \, dx$.  

(e) $\int_0^{\pi/4} \frac{\cos(4x)}{\sqrt{9 + \sin(4x)}} \, dx$
4. The graph of $y = f(t)$ on the interval $[0, 4]$ is shown below.

Let $F(x) = \int_0^x f(t) \, dt$. From Part I of the Fundamental Theorem of Calculus, determine:

(a) The open interval on which $F(x)$ is increasing (give reason).

(b) The open interval on which $F(x)$ is decreasing (give reason).

(c) The value of $x$ where $F(x)$ has a critical point (give reason).