1. The graph of \( y = f(x) \) on the interval \([0, 8]\) is shown below.

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

(a) The interval on which \( g(x) \) is increasing (give reason).

(b) The interval on which \( g(x) \) is decreasing (give reason).

(c) The value of \( x \) where \( g(x) \) has a critical point (give reason).

(d) The values of \( g(x) \) at the points \( x = 2 \) and \( x = 3 \) (by inspection of the figure).

2. Practice your integration skills by finding the following integrals:

(a) \( \int \frac{1}{\sqrt{3x-5}} \, dx \)
(b) \[ \int \frac{x + 2x^3}{(x^4 + x^2)^3} \, dx \]

(c) \[ \int 3 \cos^4(5x) \sin(5x) \, dx \]

3. Find the area bounded between \( y = x^4 \) and \( y = 2 - x^2 \).

4. Consider the function \( f(x) = \begin{cases} 
  x, & \text{if } 0 \leq x \leq 1, \\
  -x^2 + 2x, & \text{if } 1 < x \leq 2.
\end{cases} \)

Compute \( \int_0^2 f(x) \, dx \).