1. Use the graph of $f$ below to answer the following questions. Define $G(x) = \int_{0}^{x} f(t) \, dt$ for $0 \leq x \leq 6$.

(a) $\int_{0}^{1} f(x) \, dx < > (\text{circle one}) \int_{0}^{2} f(x) \, dx$

(b) List all the critical points of $G(x)$.

(c) What are the intervals on which the graph of $G(x)$ is increasing?

(d) What are the intervals on which $G(x)$ is decreasing?

(e) The graph of $G(x)$ has a local minimum / maximum (circle one) at $x = 0$. Justify your answer.

(f) The graph of $G(x)$ has a local minimum / maximum (circle one) at $x = 6$. Justify your answer.
2. Suppose $f(t)$ is continuous and $f(t) > 1$ for all $t \geq 0$. Define functions $F(x)$ and $G(x)$ by the equations

$$F(x) = \int_0^x f(t)\,dt$$

and

$$G(x) = \int_5^x f(t)\,dt.$$

(a) Which is larger, $F(1)$ or $F(2)$? Explain how you know.

(b) Which is larger, $F(6)$ or $G(6)$? Explain how you know.

(c) Explain why $F(x) > F(0)$ for all $x > 0$.

(d) Explain why $F(x) = G(x) + C$ for some constant $C$.

(e) Is $C$ positive or negative? Explain how you know.
3. Let \( g(x) = \int_0^x f(t) \, dt \) for \(-2 < x < 1.25\). Below is the graph of \( f(x) \):

(a) On what interval(s) is \( g(x) \) increasing?  
(b) On what interval(s) is \( g(x) \) decreasing?

(c) On what interval(s) is \( g(x) \) concave up?  
(d) On what interval(s) is \( g(x) \) concave down?

(e) Determine the values of the following:

\[
g(0) = \quad \frac{dg}{dx}\bigg|_{x=1} = \quad \frac{d^2g}{dx^2}\bigg|_{x=-1} =
\]