Sample Questions
Show all your work on a separate sheet of paper. Indicate clearly the methods you use because you will be graded on the correctness of your methods as well as on the accuracy of your answers.

Multiple Choice

1. Find \( g'(1) \) if \( g(x) = \int_0^x t^2 e^t \, dt \).
   
   (a) \( e \)  \hspace{1cm} (b) \( 2e \)  \hspace{1cm} (c) \( e - 1 \)  \hspace{1cm} (d) \( 3e \)  \hspace{1cm} (e) \( 4e \)

2. Let \( h(x) = \int_0^x \sqrt{1 + r^4} \, dr \). Find \( h'(1) \).
   
   (a) \( -\sqrt{2} \)  \hspace{1cm} (b) \( \sqrt{2} \)  \hspace{1cm} (c) \( -2\sqrt{2} \)  \hspace{1cm} (d) \( 2\sqrt{2} \)  \hspace{1cm} (e) \( 4\sqrt{2} \)

3. Find the range of the function \( F(x) = \int_{-4}^x \sqrt{16 - t^2} \, dt \).
   
   (a) \( [-4, 4] \)  \hspace{1cm} (b) \( [-4, 0] \)  \hspace{1cm} (c) \( [0, 4] \)  \hspace{1cm} (d) \( [0, 4\pi] \)  \hspace{1cm} (e) \( [0, 8\pi] \)

Free Response

The graph of the function \( f \) defined on \([-2, 2]\) is shown in the figure. Let

\[
F(x) = \int_{-2}^{2x+1} f(t) \, dt.
\]

(a) Find \( F\left(-\frac{3}{2}\right) \).

(b) Find \( F'(x) \) and \( F'(0) \).

(c) Find the domain of \( F \).

(d) Find the \( x \)-coordinate of the minimum of \( F \). Show the analysis that leads to your conclusion.