5. [10 points] Suppose that \( f(x) \) and \( g(x) \) are twice differentiable functions defined for all \( x \) with the following properties:

- \( f(0) = g(0) \) and \( f(1) = g(1) \).
- \( f(x) \) and \( g(x) \) are increasing.
- \( f(x) \) is concave down and \( g(x) \) is concave up.

For each of the following questions, circle the correct answer. No justification is necessary.

Solution: +2 if correct. CIRCLE CORRECT ANSWER IF WRONG.

a. [2 points] Which is larger, \( \int_0^1 f(x) \, dx \) or \( \int_0^1 g(x) \, dx \)?

\[
\int_0^1 f(x) \, dx \quad \int_0^1 g(x) \, dx \quad \text{Equal} \quad \text{Impossible to determine}
\]

b. [2 points] Which is larger, \( \int_0^1 |f(x)| \, dx \) or \( \int_0^1 |g(x)| \, dx \)?

\[
\int_0^1 |f(x)| \, dx \quad \int_0^1 |g(x)| \, dx \quad \text{Equal} \quad \text{Impossible to determine}
\]

c. [2 points] Which is larger, \( \int_0^1 f'(x) \, dx \) or \( \int_0^1 g'(x) \, dx \)?

\[
\int_0^1 f'(x) \, dx \quad \int_0^1 g'(x) \, dx \quad \text{Equal} \quad \text{Impossible to determine}
\]

d. [2 points] Which is larger, \( \int_0^1 xf'(x) \, dx \) or \( \int_0^1 xg'(x) \, dx \)?

\[
\int_0^1 xf'(x) \, dx \quad \int_0^1 xg'(x) \, dx \quad \text{Equal} \quad \text{Impossible to determine}
\]

e. [2 points] Which is larger, \( \int_0^1 f(x)f'(x) \, dx \) or \( \int_0^1 g(x)g'(x) \, dx \)?

\[
\int_0^1 f(x)f'(x) \, dx \quad \int_0^1 g(x)g'(x) \, dx \quad \text{Equal} \quad \text{Impossible to determine}
\]