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 $\int_0^1 g(x)dx$?

$\boxed{\int_0^1 f(x)dx}$ $\int_0^1 g(x)dx$ Equal Impossible to determine

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

$\int_0^1 |f(x)|dx$ $\int_0^1 |g(x)|dx$ Equal $\boxed{\text{Impossible to determine}}$

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

$\int_0^1 f'(x)dx$ $\int_0^1 g'(x)dx$ $\boxed{\text{Equal}}$ Impossible to determine

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

$\int_0^1 xf'(x)dx$ $\boxed{\int_0^1 xg'(x)dx}$ Equal Impossible to determine

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

$\int_0^1 f(x)f'(x)dx$ $\int_0^1 g(x)g'(x)dx$ $\boxed{\text{Equal}}$ Impossible to determine