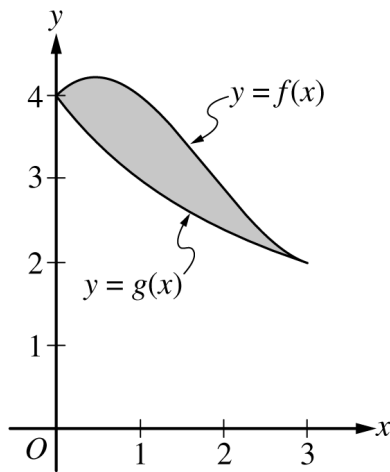




5. The graphs of the functions f and g are shown in the figure for $0 \leq x \leq 3$. It is known that $g(x) = \frac{12}{3+x}$

for $x \geq 0$. The twice-differentiable function f , which is not explicitly given, satisfies $f(3) = 2$ and

$$\int_0^3 f(x) \, dx = 10.$$

(a) Find the area of the shaded region enclosed by the graphs of f and g .

(b) Evaluate the improper integral $\int_0^\infty (g(x))^2 \, dx$, or show that the integral diverges.

(c) Let h be the function defined by $h(x) = x \cdot f'(x)$. Find the value of $\int_0^3 h(x) \, dx$.

Write your responses to this question only on the designated pages in the separate Free Response booklet. Write your solution to each part in the space provided for that part.