3. [6 points] Suppose $f(x)$ is a twice-differentiable function. On the interval $[a, b]$, for $0 < a < b$, $f(x)$ is positive, increasing, and concave up. Suppose $g(x) = x(f(x))^2$. If one uses the midpoint rule to estimate $\int_a^b g(x)dx$, will the estimation be an overestimate or an underestimate? Be sure to justify your answer and show all appropriate work. *(Hint: You might find it helpful to consider the concavity of function $g(x)$.)*