8. (10 points) Let f be a continuous, positive function for $x \geq 1$.

(a) Define what it means to say that $\int_1^\infty f(x)\,dx$ converges.

(b) If f from part (a) is such that $\int_1^\infty f(x)\,dx$ converges and if g is another continuous positive function for $x \geq 1$ that satisfies

$$g(x) \leq 5f(x) + \frac{3}{x^2}$$

then is it necessarily true that $\int_1^\infty g(x)\,dx$ converges? (Explain why or why not).