BC Module 6 DBA:
This is a non-calculator assignment. Please show all your work to support your answers.

$$f(x) = \frac{1}{x^2 + k} \qquad g(x) = \sin{(3x)}$$

The equations for the functions $f(x)$ and $g(x)$ are given above, where k is a constant.
Use the equations above to answer the following.

(a) Find $\int xf(x)dx$ in terms of x and k.

(b) Let $k = 9$, find $\int_{\sqrt{3}}^{\infty} f(x)dx$

(c) Let $k = -9$, find $\int (5x + 3)f(x)dx$

(d) Find $\int xg(x)dx$