

**Problem statement** Suppose that  $f(x) = e^{-Ax}$ , where  $A$  is a positive real number.

a) Show that the integral  $\int_1^2 f(x) dx \rightarrow 0$  as  $A \rightarrow \infty$ . (You may wish to draw a picture, but other verification is also necessary.)

b) Show that the integral  $\int_1^2 xf(x) dx \rightarrow 0$  as  $A \rightarrow \infty$ . (You may wish to draw a picture, but other verification is also necessary.)

c) Show that the integral  $\int_1^2 \frac{1}{1+5x^{48}} f(x) dx \rightarrow 0$  as  $A \rightarrow \infty$ . (You may wish to draw a picture, but other verification is also necessary.)

**Note** It isn't always necessary or even possible to compute every integral exactly. But this integral can be *estimated* to get enough information.