

Areas Between Curves

Riemann Sums and the variable of Integration

Consider the graphs of $f(x) = e^{x/2}$ and $g(x) = 2x$ shown below (Use your grapher; the graph below is only provided for your convenience).

- a) Find the numerical values of the two intersection points.
- b) Set up a Riemann sum $\sum h(x) \Delta x$ approximating the area of the region enclosed by the two curves.
- c) Using b), write a definite integral for the area of the region with x as the variable of integration.
- d) Set up a Riemann sum $\sum k(y) \Delta y$ approximating the area of the region enclosed by the two curves.
- e) Using d), write a definite integral for the area of the region with y as the variable of integration.
- f) Carry out the integrals in c and e numerically. Did you get the same answer? If not, in what step did you introduce approximations? Discuss.

