Comparing errors in midpoint and trapezoid methods

   The figure below shows the graph of a typical function (in black) for a typical subinterval. The red line is the top of a trapezoid used in the trapezoid approximation. The blue line is the top of a midpoint rectangle rotated so that it is tangent to the graph of the function. The area of the midpoint rectangle is equal to the area under this tangent line.

1. The area of the region between the red line and the graph is the error in the trapezoid approximation for this subinterval. Estimate this erro.

2. The area of the region between the blue line and the graph is the error in the midpoint approximation for this subinterval. Estimate this error.

3. Compute the ratio of the trapezoid error to the midpoint error.