More Uncertainty Problems

For each question, calculate the uncertainty using the traditional derivative based method, as well as the numerical varitaional method. When initially reporting your results write down enough significant figures so you can see at what point the two methods diverge. However when reporting a final answer use proper significant figures.

1. Calculate the surface area of a sphere (with uncertainty) with radius $r = (0.310 \pm 0.001)$m

2. If you measure two independent variables as

$$\begin{aligned} x &= 8.0 \pm 0.2 \\ y &= 4.0 \pm 0.1 \end{aligned}$$

calculate $q = xy^2 + x^2$ with uncertainty.