4. [10 points]   The Belgian scholar Lambert Quetelet published a distribution of chest measurements of Scottish soldiers in 1846. His distribution showed that the expected probability of a soldier having a chest measurement between 38 and 40 inches was given approximately by

$$P = \frac{1}{\sqrt{2\pi}} \int_{-0.9}^{0.1} e^{-y^2/2}\, dy.$$

Suppose that a scholar studying 19th century Scottish soldiers' physical measurements estimates this probability using the following calculation:

$$P = \frac{1}{\sqrt{2\pi}} \int_{-0.9}^{0.1} e^{-y^2/2}\, dy \approx \frac{1}{\sqrt{2\pi}} (0.25)(0.7406 + 0.8713 + 0.9629 + 0.9997) = 0.3565.$$

(a) [6 points of 10]   What numerical method did the scholar use, how many steps were used in the method, and what was the step size?

(b) [4 points of 10]   Sketch a graph of $e^{-y^2/2}$. Explain how your graph indicates whether the scholar's approximation is an over- or under-estimate for the actual value of the integral.