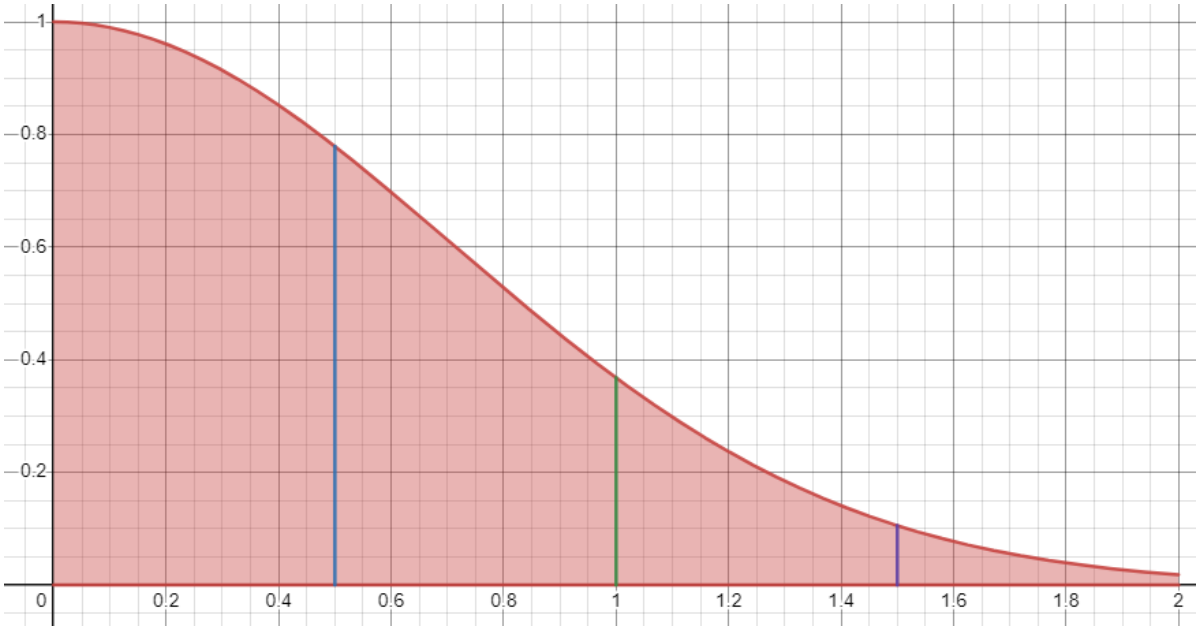


This shows the graph of the function $f(x) = e^{-x^2}$ for $0 \leq x \leq 2$

a) Use the trapezium rule, with four strips as shown, to estimate $\int_0^2 f(x)\,dx$, giving your answer to 4 decimal places.

b) Use your answer to part a to estimate the following integrals.

i) $\int_0^2 2e^{-x^2}\,dx$

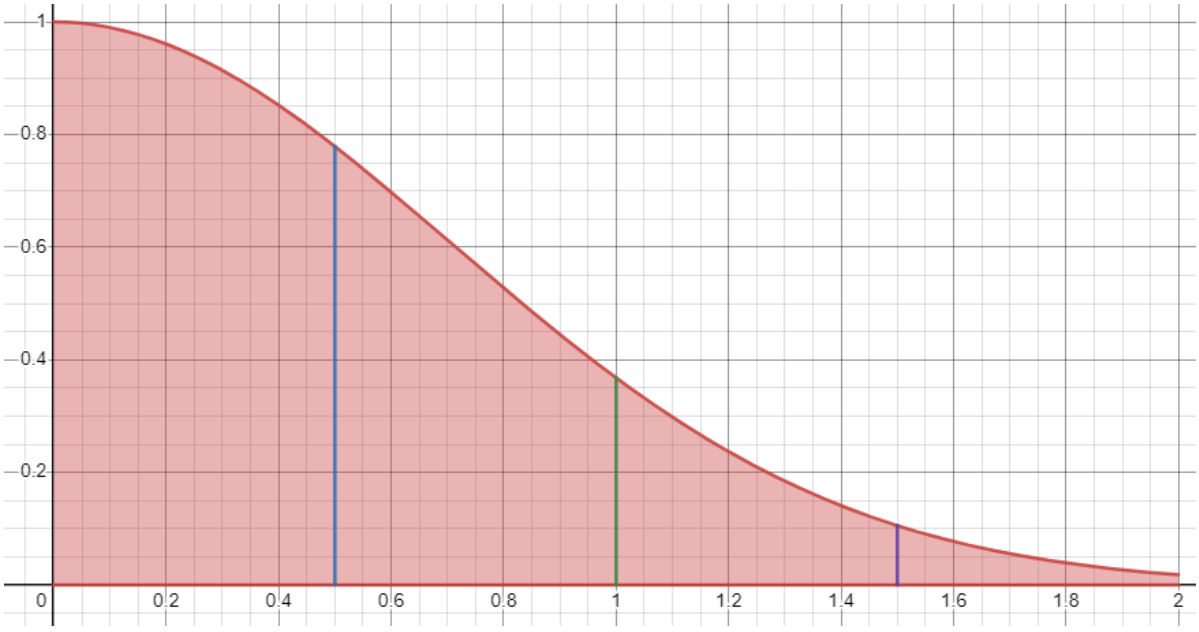
ii) $\int_0^2 4e^{-x^2} - 3\,dx$

iii) $\int_1^3 e^{-(x-1)^2}\,dx$

iv) $\int_0^2 e^{-x^2+5}\,dx$

v) $\int_0^1 e^{-4x^2}\,dx$

vi) $\int_{-1/2}^{1/2} e^{-(4x^2+4x+1)}\,dx$



This shows the graph of the function $f(x) = e^{-x^2}$ for $0 \le x \le 2$

a) Use the trapezium rule, with four strips as shown, to estimate $\int_0^2 f(x)\,dx$, giving your answer to 4 decimal places. 0.8806

b) Use your answer to part a to estimate the following integrals.

i) $\int_0^2 2e^{-x^2}\,dx = 2\int_0^2 e^{-x^2} = 2 \times 0.8806 = 1.7612$

ii) $\int_0^2 4e^{-x^2} - 3\,dx = 4\int_0^2 e^{-x^2} - \int_0^2 3\,dx = 4 \times 0.8806 - [3x]_0^2 = -2.4776$

iii) $\int_1^3 e^{-(x-1)^2}\,dx$ $u = x-1$, $du = dx$ $= \int_0^2 e^{-u^2}\,du = 0.8806$

iv) $\int_0^2 e^{-x^2+5}\,dx = \int_0^2 e^{-x^2} e^5\,dx = e^5\int_0^2 e^{-x^2}\,dx = e^5 \times 0.8806 = 130.6926$

v) $\int_0^1 e^{-4x^2}\,dx$ $u = 2x$, $u^2 = 4x^2$, $dx = \frac{1}{2}du$ $= \int_0^2 \frac{1}{2}e^{-u^2}\,du = \frac{1}{2} \times 0.8806 = 0.4403$

vi) $\int_{-1/2}^{1/2} e^{-(4x^2+4x+1)}\,dx = \int_{-1/2}^{1/2} e^{-(2x+1)^2}\,dx$ $u = 2x+1$, $dx = \frac{1}{2}du$ $= \int_0^2 \frac{1}{2}e^{-u^2}\,du = \frac{1}{2} \times 0.8806 = 0.4403$