A6 Q1

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1. $S'(x) = \frac{2e^{-x^2}}{\sqrt{\pi}}$ $S''(x) = -\frac{4xe^{-x^2}}{\sqrt{\pi}}$ $S'''(x) = \frac{8x^2e^{-x^2} - 4e^{-x^2}}{\sqrt{\pi}}$ $0 = \frac{8x^2e^{-x^2} - 4e^{-x^2}}{\sqrt{\pi}}$

$0 = 8x^2e^{-x^2} - 4e^{-x^2}$ $0 = 8x^2 - 4$ $8x^2 = 4$ $x^2 = \frac{1}{2}$ $x = \pm\sqrt{\frac{1}{2}}$

$S''(0) = 0$ $S''(\sqrt{1/2}) = -0.96789$ $S''(2) = -0.08266$ $10^{-6} = -\frac{1}{12} \cdot 2 \cdot \left(\frac{2}{n}\right)^2 \cdot S''(1/\sqrt{2})$

$10^{-6} = -\frac{1}{6} \frac{4}{n^2} \cdot S''(1/\sqrt{2})$ $10^{-6} = -\frac{2}{3} \cdot \frac{1}{n^2} \cdot S''(1/\sqrt{2})$ $n^2 = -\frac{2}{3} \cdot \frac{1}{10^{-6}} \cdot S''(1/\sqrt{2})$ $n^2 = \sqrt{645260}$ $n = \pm 803.28$

804 points