

Math 102 — Taylor series and the normal distribution

Problem 1. Suppose a set of standardized test scores is normally distributed with mean $\mu = 100$ and standard deviation $\sigma = 10$. Set up an integral that represents the probability that a test score will be between 90 and 110. Use a Maclaurin series and term-by-term integration to write the value of the integral as an infinite series. Find the sum of the first 6 terms of the series as an approximation for the value of the integral.

Problem 2. You might recall the following fact, that we mentioned in passing earlier in the semester: if the alternating series $\sum_{n=0}^{\infty} (-1)^n a_n$ converges to L then $|s_n - L| \leq a_{n+1}$. In words, this says the error in using the n th partial sum to approximate the sum of an alternating series is at most the absolute value of the $n + 1$ st term of the series. Use this fact to give an estimate for your approximation of the actual probabilities in Problem 1.