ASSIGNMENT 8

There are two parts to this assignment. The first part is on WeBWorK — the link is available on the course webpage. The second part consists of the questions on this page. You are expected to provide full solutions with complete justifications. You will be graded on the mathematical, logical and grammatical coherence and elegance of your solutions. Your solutions must be typed, with your name and student number at the top of the first page. If your solutions are on multiple pages, the pages must be stapled together.

*Your written assignment must be handed in **before your recitation on Wednesday, March 23**. The online assignment will close at **9:00 a.m. on Friday, March 25**.*

1. Determine the Maclaurin polynomial of minimal degree needed to calculate $\sin(1)$ to an accuracy of 3 decimal places.

2. Let $f(x) = (x-1)^7 e^x$. Calculate $f^{(50)}(1)$.

3. A random variable is *normally distributed* with mean μ and standard deviation $\sigma > 0$ if its *probability density function* is given by

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(x-\mu)^2/(2\sigma^2)}$$

   The probability that a normally distributed random variable is in the interval (l, r) is given by $\displaystyle\int_l^r f(t)\,dt$.

   Let P be the probability that a normally distributed random variable is "within one standard deviation of the mean" — that is, in the interval $(\mu - \sigma, \mu + \sigma)$. Calculate P to within 0.001 of its actual value.