

Math 121 additional review problems for the final exam

- A1. The integral $\int_0^1 e^{-x^3} dx$ cannot be evaluated exactly. What are two ways we have seen in this course to approximate this integral? What are the advantages and disadvantages of each one?
- A2. Use material from the course to approximate each of the following numbers with a maximum error of 0.1: e , \sqrt{e} , $\sin 2$, $\ln 2$, $\sqrt{2}$. Some ideas you may want to use are Taylor Series, the alternating series error estimate, Taylor polynomials, and the Taylor polynomial error estimate.
- A3. Determine a power series representation for $\tan^{-1}(x)$, find its interval of convergence, and use it to come up with an incredible power series representation for π . [Hint: start by finding a power series representation for $1/(1+x^2)$, and then integrate. When you're done, evaluate the resulting power series at $x = 1$ to get an expression involving π .]
- A4. Use Power series to approximate

$$\int_0^1 \frac{\sin(x^2)}{x} dx$$

to within 0.01.

- A5. Suppose that you are at the beach, looking out over the horizon, and your eye level is 1.5 meters above the ground. Use MacLaurin series to approximate the distance that you can see to the horizon. What happens if you're looking out a window that's 18 meters high?