Math 121 additional review problems for the final exam

A1. 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.

A2. 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.]

A3. Use power series to approximate

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

to within 0.01.