Name:_____   **UT EID:**_____

Present Calculus Course:_____   **Instructor:**_____

Permanent Mailing Address:_____

_____

E-mail address:_____

College (Natural Sciences, Engineering, etc.)_____

Show all work in your solutions; turn in your solutions on the sheets provided. No calculators allowed. (Suggestion: Do preliminary work on scratch paper that you don't turn in; write up final solutions neatly and in order; write your name on all pages turned in.)

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1. Which is larger — e^π or π^e? You must answer without a calculator of course, and memorized digits are also useless unless you can explain how those digits are computed. Use some calculus to describe these numbers.

2. Compute the limit
$$\lim_{n\to\infty} \frac{1^4 + 2^4 + 3^4 + \ldots + n^4}{n^5}$$

3. Compute $\displaystyle\int \frac{1}{\sqrt{x} + \sqrt[3]{x}}\, dx$

4. Compute
$$F(x) = \int_0^2 \frac{\partial}{\partial y}\left(\frac{x^y - 1}{\ln(x)}\right)\, dy$$

   and
$$\int_0^1 F(x)\, dx = \int_0^1 \int_0^2 \frac{\partial}{\partial y}\left(\frac{x^y - 1}{\ln(x)}\right)\, dy\, dx$$

5. Describe the set of all points which are equidistant between the planes $x + y + 2z = 4$ and $2x + 5y + 5z = 10$.