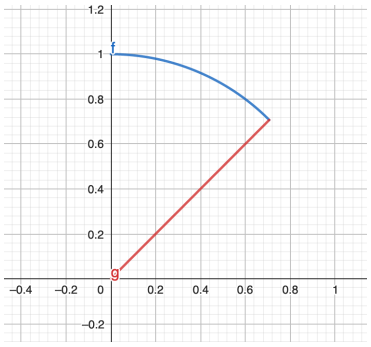
Review for Exam III Calculus II

The usual caveats for a Review apply: This was last semester's Exam III.

1. (20 points) For the region pictured below, set up an appropriate double integral to find the volume under the scalar function $f(x) = x^2 + y^4$. Do not evaluate the double integral.



2. (15 points each) Do the following series converge or diverge? If a series converges, does it converge absolutely or conditionally? Explain—guessing will gets no credit.

$$\sum_{k=1}^{\infty} \frac{k^8}{8^k} \qquad \sum_{k=1}^{\infty} \frac{(-1)^{k+1}\ln(k)}{k} \qquad \sum_{k=1}^{\infty} \frac{k^4}{k^5+k}$$

3. (20 points) Find the RoC and the IoC for the following power series:

$$\sum_{k=1}^{\infty} \frac{(x-3)^k}{k \cdot 5^k}$$

4. (20 points) Estimate the integral below (very important in statistics):

$$\int_0^1 e^{-x^2}\, dx$$

by finding the first three terms of the Taylor Series for the function and integrating those three terms. You should end up with the sum of a small number of actual fractions. That sum is sufficient for the answer; DON'T add the fractions together!