**Mathematics II**

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Final Exam
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1. Evaluate the integral.

$$\int \cos x \ \ln(\sin x) \ \ dx$$

2. Sketch the curve r = 2 sin t and then find the area enclosed by it.

3. Find the interval of convergence of the power series.

$$\sum \frac{(-1)^n \times (x+1)^n}{n^2}$$

4. Evaluate the double integral by changing the order of dx dy.

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

5. Set up a multiple integral (no need to evaluate) for the volume of the upper half of the sphere $x^2 + y^2 + z^2 = R^2$ using

   a) the xyz coordinates
   b) the cylindrical coordinates