

Calculus

November 2013

1. For what value of p does the following series converge

$$\sum_{n=2}^{\infty} \frac{1}{n (\ln n)^p}.$$

2. Find the largest and smallest values of $f(x, y) = 2xy$ on the ellipse $\frac{x^2}{16} + \frac{y^2}{4} = 1$.
3. Evaluate the integral

$$\int_C xy \, dy - y^2 \, dx,$$

where C is the square cut from the first quadrant by the lines $x = 1$ and $y = 1$, oriented counterclockwise.