



PUTNAM EXAM SEMINAR  
FALL 2012

ASSIGNMENT 4  
DUE SEPTEMBER 24

**Exercise 1.** Find the volume of the region of points  $(x, y, z)$  such that

$$(x^2 + y^2 + z^2 + 8)^2 \leq 36(x^2 + y^2).$$

[Putnam 2006, A1]

**Exercise 2.** Evaluate

$$\int_2^4 \frac{\sqrt{\ln(9-x)}}{\sqrt{\ln(9-x)} + \sqrt{\ln(x+3)}} dx.$$

[Putnam 1987, B1]