PUTNAM SEMINAR
FALL 2019

QUIZ 6
DUE OCTOBER 9

Name:_____

Start Time:_____

End Time:_____

Problem 1. Evaluate $\displaystyle\int_0^{\pi/2} \ln \sin x \, dx$.

Problem 2. Let R be the region consisting of all triples (x, y, z) of nonnegative real numbers satisfying $x + y + z \leq 1$. Let $w = 1 - x - y - z$. Express the value of the triple integral

$$\int\int\int_R xy^9 z^8 w^4 \, dx \, dy \, dz$$

in the form $a!b!c!d!/n!$, where a, b, c, d and n are positive integers.

Problem 3. Show that the improper integral

$$\lim_{B \to \infty} \int_0^B \sin(x) \sin(x^2) \, dx$$

converges.

Problem 4. Evaluate $\displaystyle\int_0^1 \frac{\ln(1+x)}{1+x^2} \, dx$.

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