MC Integration

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Introduction

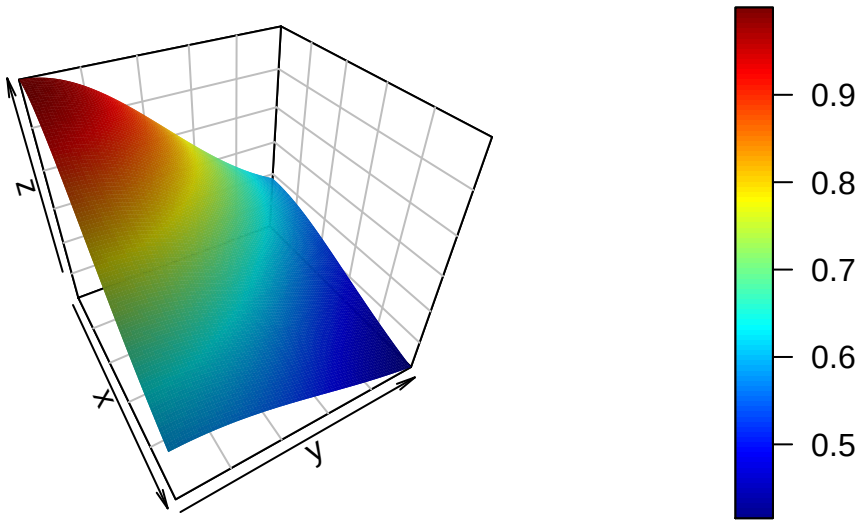
For this project, we compute the integral

$$\int_0^1 \int_0^1 \frac{1}{1+\sin^2(x)+\sin^2(y)} dxdy$$

using Monte Carlo integration.

Function surface plot

Below we can see a 3D surface plot of the integrand.



Monte Carlo integration R code

Below is included the R code used for the Monte Carlo integration.

```
set.seed(100)  # sets state for rng
n <- 10000
rand_x <- runif(n,min=0,max=1)  # generates n unif rn between 0 and 1
```

```r
rand_y <- runif(n,min=0,max=1)  # and again

# approximating trig integral
trig_fun  <- function(x,y){
  denominator <- 1 + sin(x)^2 + sin(y)^2
  return(1/denominator)
}

trig_vals <- trig_fun(rand_x,rand_y)  # function vals
trig_int_approx <- mean(trig_vals)  # integral approximation by calculating mean
```