
```
% John Heath
% ACM 116 Problem Set 2
% Problem 5
clc; clear; close all;

fprintf("The real value of I is %.4f.\n", 1./4);
% Part A
% To approximate  $I = \int_0^1 x^3 dx$ , We can take the sum:
%  $(1/N) * \sum_{i=1}^N x_i^3$ 
samples = rand(100,1);
approx_1 = (1 ./ 100) .* sum(samples.^3);
fprintf("The Monte Carlo Approx. for I using the uniform distribution
is %.4f.\n"...
, approx_1);

% Part B (see explanation on earlier page)
x = betarnd(4, 1);
f = betapdf(x, 4, 1);
fprintf("The Monte Carlo Approx. for I using the beta distribution is
%.4f.\n"...
, x.^3 ./ f);

The real value of I is 0.2500.
The Monte Carlo Approx. for I using the uniform distribution is
0.2516.
The Monte Carlo Approx. for I using the beta distribution is 0.2500.
```

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