
```

% Compare the efficiency of 2*sample median and sample mean
R = 300; N = 400; theta_e = 2;
med4_x = zeros(R,1); mean2_x = zeros(R,1);

for r = 1:R
    xvec = sample_cuspdf(theta_e,N);
    med4_x(r) = 4*median(xvec);
    mean2_x(r) = 2*mean(xvec);
end

if (var(mean2_x) < var(med4_x))
    estflag = 1;
else
    estflag = 2;
end

% Generate data
datagen_quiz2

theta_0 = randsample(4,1);
N = length(ykvec);

for r = 1:R
    xvec = sample_cuspdf(theta_0,N);
    med4_x(r) = 4*median(xvec);
    mean2_x(r) = 2*mean(xvec);
end

% Estimate the CDF
if (estflag == 1)
    [Fxs,xs] = ecdf(med4_x);
elseif (estflag == 2)
    [Fxs,xs] = ecdf(mean2_x);
end

% Compute the 95% probabilistic interval
diff_Fl = Fxs - 0.025;
[~,ind_l] = min(abs(diff_Fl));
diff_Fu = Fxs - 0.975;
[~,ind_u] = min(abs(diff_Fu));

L = xs(ind_l); U = xs(ind_u);

% Check if the observed statistic falls within the 95% interval
if (estflag == 1)
    obs_stat = 4*median(ykvec);
elseif (estflag == 2)
    obs_stat = 2*mean(ykvec);
end

if (obs_stat < L) || (obs_stat > U)
    hflag = 0;

```

```
else
    hflag = 1;
end
```

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```
function xvec = sample_cuspdf(theta,N)

% Function to sample randomly from a custom distribution
% Written for Quiz 2

% Arun K. Tangirala
% Nov. 07, 2020
```

Sample uniformly

```
r_cdf = unifrnd(0,1,N,1);
%theta = randsample(4,1);
xvec = Fxinv(theta,r_cdf);

Not enough input arguments.

Error in sample_cuspdf (line 10)
r_cdf = unifrnd(0,1,N,1);
```

Variate from inverse of CDF

```
function x = Fxinv(theta,r)

t = (1 - r).^(1/3);
x = theta*(1-t)./t;

end

end
```

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```
% Script to generate data for question in Quiz 2 of CH5115
%
% Arun K. Tangirala
% November 07, 2020

N = 250;
r_cdf = unifrnd(0,1,N,1);
theta = randsample(4,1);
ykvec = Fxinv(theta,r_cdf);

clear theta r_cdf N
```

Variate from inverse of CDF

```
function x = Fxinv(theta,r)

t = (1 - r).^(1/3);
x = theta*(1-t)./t;

end
```

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