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invWk5.m | invWk5b.m

```
%% Inverse Problem Ex #5
% Goal is to draw samples from ditribution
%
% $$\xi_C e^{-1/ \sigma^2 || v-f(\mathbf{x})||^2}^2$$
%

%% set up
% Define both f and F and $F^{-1}$, (one) method of executing random walk in
% unit circle. Also we have the posterior density, and use it to estimate
% the goodness of our results.
Gamma = 0.3;
% F and inverse of F
F= @(x)1./(1-norm(x).^2).*x;
Fi = @(F)(   -1+sqrt(1+4*norm(F)*norm(F)    )  )./(2*norm(F))*F./norm(F);
% det DF and density of F(y)|F(x)
DF = @(x)abs(norm(x)+1/((norm(x)-1).^3) );
piW = @(x)1/(2*pi*Gamma.^2) *exp(-1/(2*Gamma^2)*norm(x)^2);
% auxiliaries for the charged particle simulation
f = @(x,P) 1./arrayfun(@(idx) norm(x-P(idx,:)), 1:size(P,1))';
charCirc = @(x)norm(x)<=1;
[x1,x2] = meshgrid( linspace(-1,1));
posteriorDensity= @(x,v,sigma,P) exp((-norm(v-f(x,P))^2)/(2*sigma^2));

%% simulate measurements v
% The vector v holds the measurments that define the posterior density $\pi$
n = 3;
theta = 0:2*pi/n:2*pi;
theta = theta(1:end-1);
P = [cos(theta)',sin(theta)'];
X = [0.4,0.5];
q = 1;
v = q*f(X,P);
sigma = (0.15*max(abs(v)));
e = randn(size(v))*sigma;
v = v+e;

%% visualize
% Arrayfun would provide shorter code, but not significant speedup without
% heavily modifying the posterior function
dens = zeros(size(x1));
for ii = 1:length(x1)
    for jj = 1:length(x2)
        dens(ii,jj) = charCirc([x1(ii,jj),x2(ii,jj)]).*exp(-1/sigma.^2*norm(v-f([x1(ii,jj),x2(ii,jj)],P))^2);
    end
end
figure(1);
imagesc([-1,1],[-1,1],-dens);
colormap gray
hold on
plot(X(1),X(2),'g.')

%% MH-setup
% Use Metropolis-Hastings to execute the random walk. Here, we setup the
% algorithm, selecting the initial point etc.
N = 512;
```

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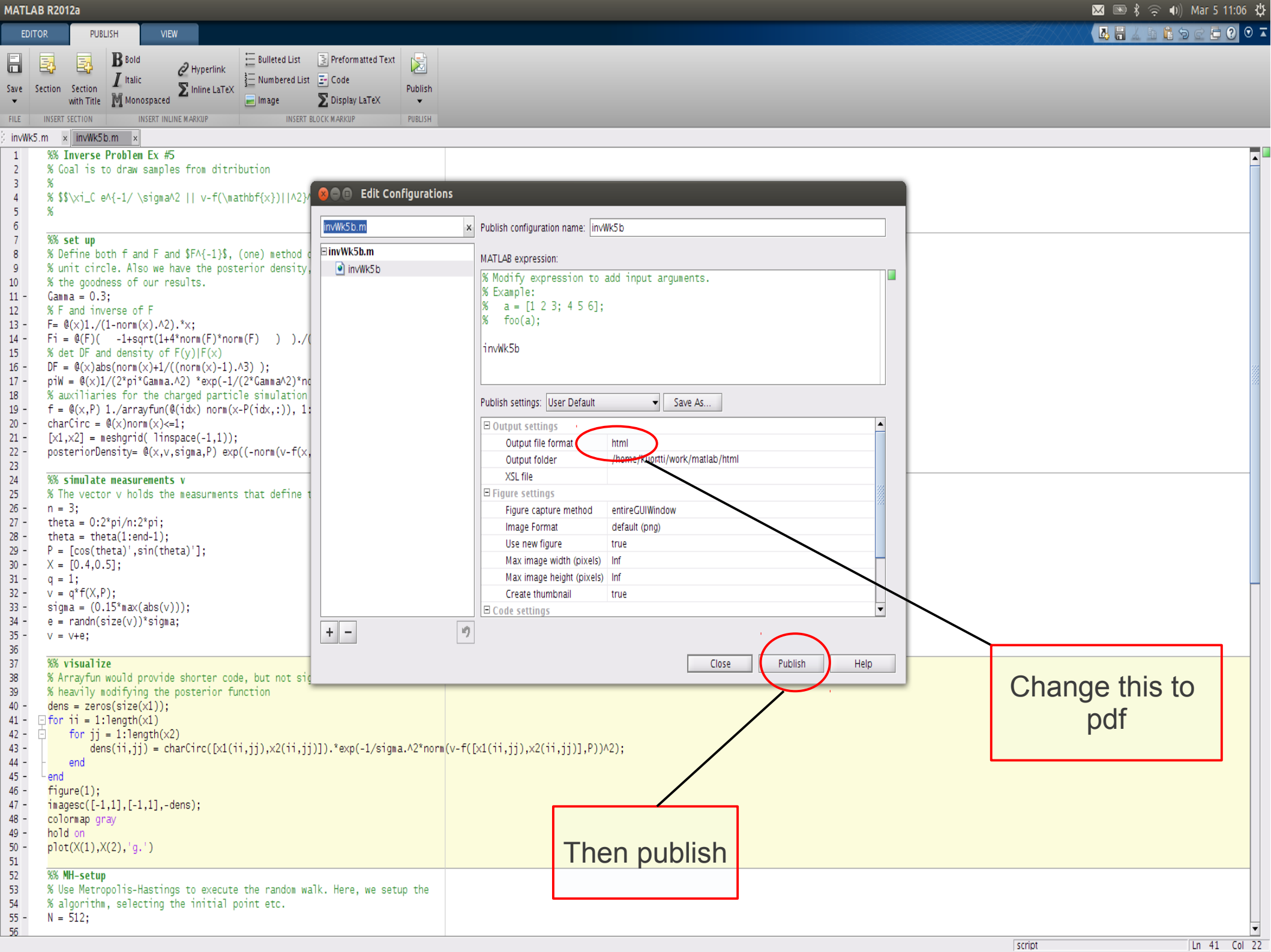
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invWk5b.m
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% Example:
% a = [1 2 3; 4 5 6];
% foo(a);
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Inverse Problem Ex #5

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Goal is to draw samples from ditribution

$$\chi e^{\frac{-1}{\sigma^2 \|v - f(x)\|^2}}$$

Set up

Define both f and F and F^{-1}, (one) method of executing random walk in unit circle. Also we have the posterior density, and use it to estimate the goodness of our results.

```
Gamma = 0.3;
```