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% gda02_09
%
% 1D uniform p.d.f.,  $p(d)=\text{constant}$ , transformed to  $p(m)$  with  $m(d)=d^2$ 
% note that  $m=\sqrt{d}$  and that  $dm/dd=0.5/\sqrt{d}$ 
% Supports Figure 2.9

clear all;

% d-axis
Dd = 0.01;
N = 100;
d = Dd*[1:N]';
dmin=0;
dmax=1;

% m-axis
Dm = 0.01;
M = 100;
m = Dm*[1:M]';
mmin=0;
mmax=1;

% uniform,  $p(d)$ 
dlbar = 5;
pd = ones(N,1);

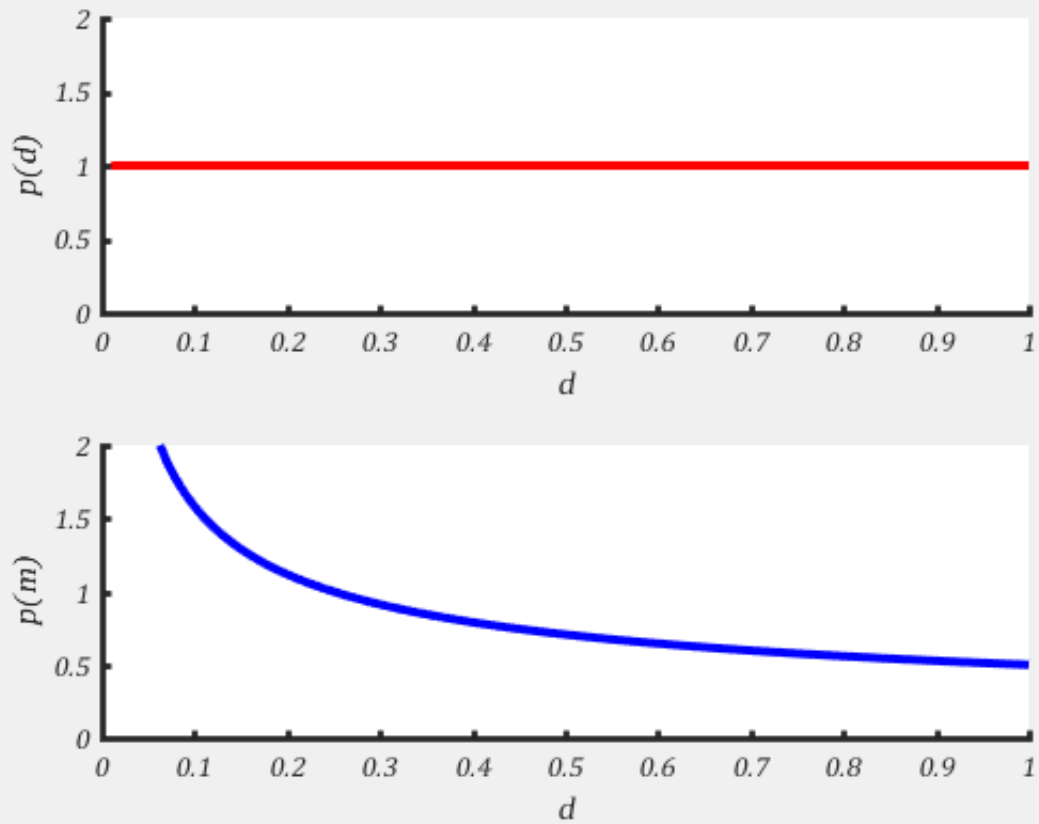
% transform to  $p(m)$ 
J = abs(0.5 ./sqrt(d));
pm = pd.*J;

figure(1);
clf;

subplot(2,1,1);
set(gca, 'LineWidth',2, 'FontName', 'Cambria Math', 'FontAngle', 'italic');
hold on;
axis( [0, 1, 0, 2] );
plot(d,pd, 'r-', 'LineWidth',3);
xlabel('d', 'FontName', 'Cambria Math', 'FontAngle', 'italic');
ylabel('p(d)', 'FontName', 'Cambria Math', 'FontAngle', 'italic');

subplot(2,1,2);
set(gca, 'LineWidth',2, 'FontName', 'Cambria Math', 'FontAngle', 'italic');
hold on;
axis( [0, 1, 0, 2] );
plot(m,pm, 'b-', 'LineWidth',3);
xlabel('d', 'FontName', 'Cambria Math', 'FontAngle', 'italic');
ylabel('p(m)', 'FontName', 'Cambria Math', 'FontAngle', 'italic');

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% Figure 2.9 (A) The uniform probability density function $p(d) = 1$ on the interval $0 < d < 1$.
 % (B) The transformed probability density function $p(m)$, given the relationship $m = 2d$.
 % Note that a patch (shaded rectangle) of probability in m is wider and lower than the
 % equivalent patch in d .