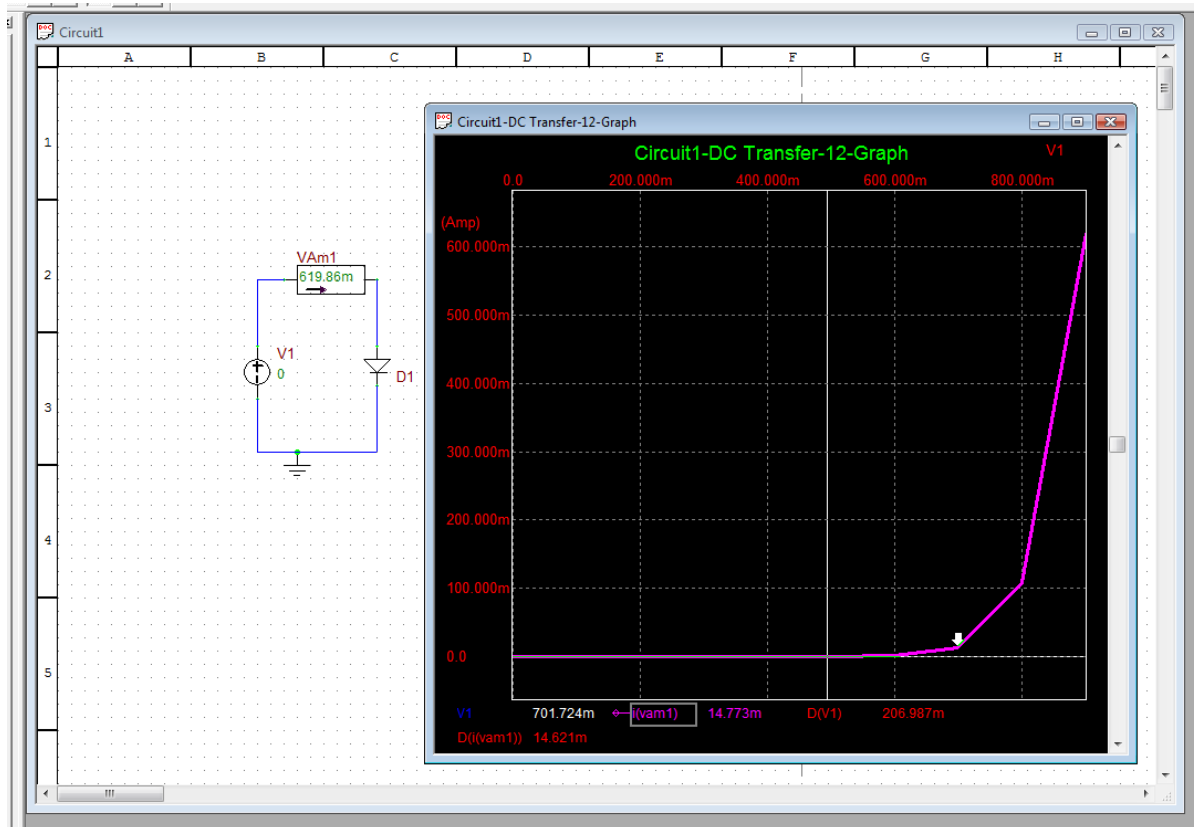


EE462 - Prelab 2

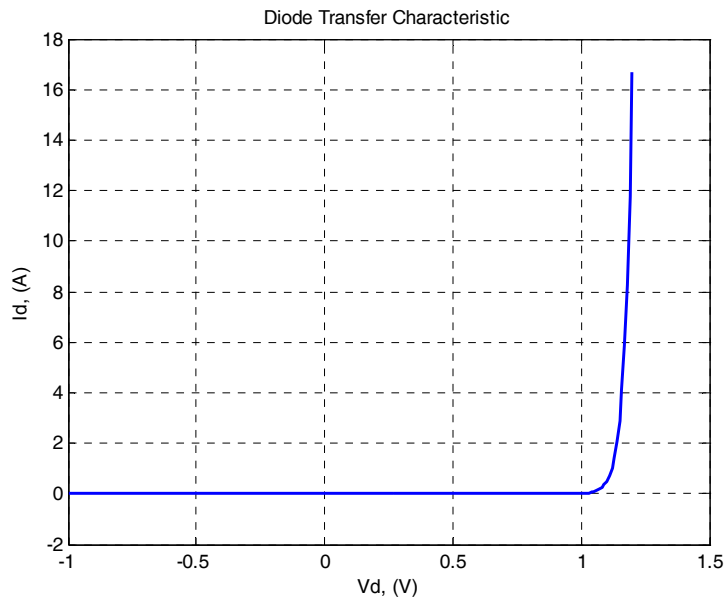
Stephen Maloney

1) Note - the lab was not very clear as to what circuit you should make (ie - does it have a resistor or not in series?), so any resistor / diode circuit would be fine.



Using the ideal diode model, replacing the diode once in forward bias by a voltage source of 0.7V, is a fairly valid assumption. The exponentially growing current that occurs when the voltage across the diode exceeds 0.7V by any significant amount would actually destroy the diodes used in the lab, something that SPICE does not attempt to model.

2)



```
% EE462 - Prelab 2
clear all; clc; close all;

Vd = -1:.01:1.2;
Is = 1e-17;
n = 1.1;
Vt = .026;

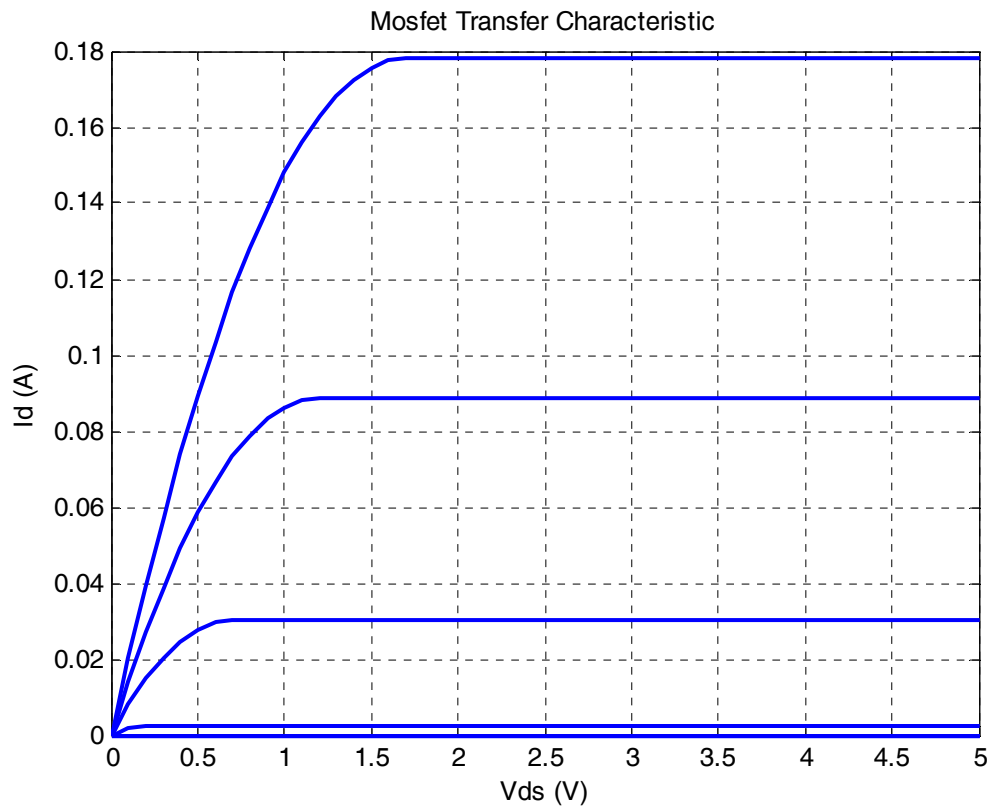
Id = diodetc(Vd, Is, n, Vt);

plot(Vd, Id, 'Linewidth', 2); grid on;
title('Diode Transfer Characteristic');
xlabel('Vd, (V)'); ylabel('Id, (A)');

function [Id] = diodetc(Vd, Is, n, Vt)
% DIODETC - generate diode transfer characteristic.
%
% Written by Stephen Maloney
%
% Usage :
%   Id = diodetc(Vd, Is, n, Vt)
%
% Input :
%   Vd - Vector of diode input voltages
%   Is - Diode saturation current
%   n - Emission coefficient
%   Vt - Thermal voltage
%
% Output :
%   Id - Diode transfer characteristic

Id = Is*(exp(Vd./(n*Vt))-1);
```

3)



```
Kp = .1233;  
W = 1;  
L = 1;  
Vtr = 1.8;  
Vgs = .5:.5:3.5;  
Vds = 0:.1:5;  
  
for idx = 1:length(Vgs)  
    Id = nmos(Vds, Vgs(idx), Kp, W, L, Vtr);  
    plot(Vds, Id, 'LineWidth', 2); grid on; hold on;  
end  
title('Mosfet Transfer Characteristic'); xlabel('Vds (V)'); ylabel('Id (A)');
```