# Dr. Leon VanDommelen (10/08/19) 1

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**IMPORTANT:**

Do not change **anything** in this header (besides your name and exam date above as needed)!

Put your solution to the question completely at the end of this file.

# EXAM 1, Question 1

```
if ~exist('___code___','var') ; clear ; end
format compact
more off
```

# Additional file: Distance.m
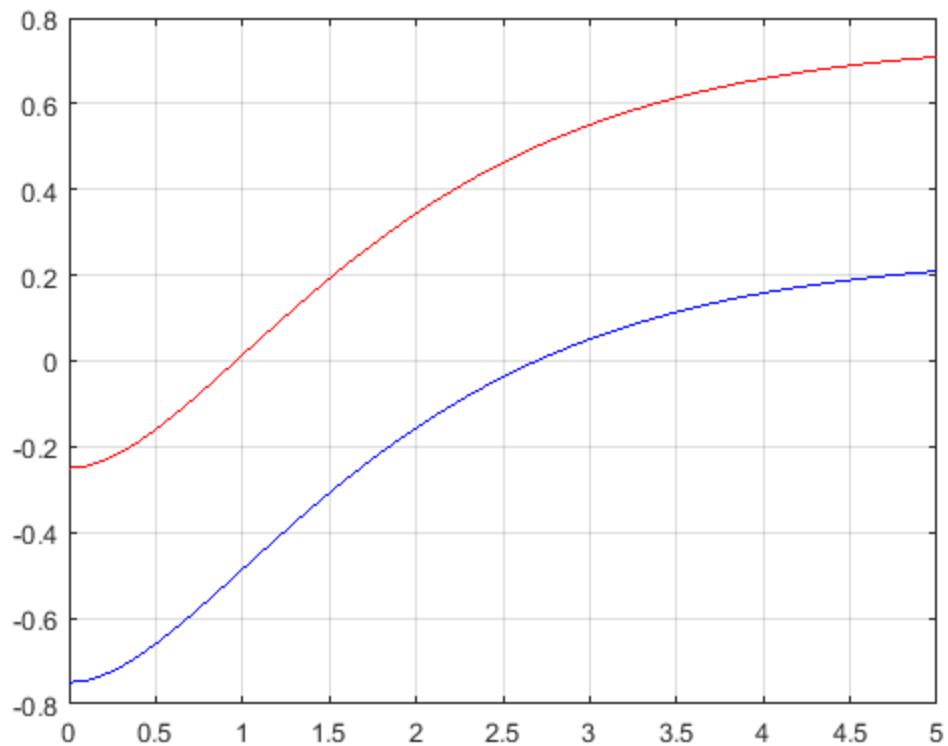
```
function d = Distance(t,S)

% compute the distance from the ground
d=1-exp(-t)-t.*exp(-t)-S;

end
```

# SOLUTION:

```
% create plot values of the functions
tPlot=linspace(0,5,51);
d1Plot=Distance(tPlot,0.25);
d2Plot=Distance(tPlot,0.75);

% plot the curves
plot(tPlot,d1Plot,'r',tPlot,d2Plot,'b')
grid on
```

Note in the plot that both functions are of *opposite sign* at t = 0 and 5, so that that interval will work in `fzero`.

```matlab
% set the interval
interval=[0 5];

% find the roots and print them out
S=0.25;
t=fzero(@(t) Distance(t,S),interval);
fprintf(...
    'For S = %4.2f, t = %.6f (interval [%.0f %.0f]).\n',...
    S,t,interval)
S=0.75;
t=fzero(@(t) Distance(t,S),interval);
fprintf(...
    'For S = %4.2f, t = %.6f (interval [%.0f %.0f]).\n',...
    S,t,interval)

For S = 0.25, t = 0.961279 (interval [0 5]).
For S = 0.75, t = 2.692635 (interval [0 5]).
```

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