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%4.1 set C (m0=75)

ti=0;
tf=24;
npts=240;
T0=65;
k=0.25;
m0=75;
tm=0:.1:24;
M=75-12*cos(pi*(tm-5)/12);
[out1,out2]=rk4(ti,tf,npts,T0,@differential);

%T(t)
figure(1);
hold on
plot(out1,out2,'blue');
plot(tm,M,'Red');
title('Temperature over time with varying outside temperature, with no other
      heating or cooling, and M_0 = 75')
xlabel('Time (hr)','FontSize',16)
ylabel('Temperature (°F)','FontSize',16)
legend('Indoor Temperature','Outdoor Temperature')
xticks(0:4:24)
xlim([0 24])
grid on
grid minor
hold off

maxOutdoor = max(M,[],'all'); %87
indexOfMaxOutdoor = find(M==maxOutdoor);%171
timeOfMaxOutdoor = tm(indexOfMaxOutdoor);%17

maxIndoor = max(out2,[],'all'); %83.193386289547750
indexOfmaxIndoor = find(out2==maxIndoor);%202
timeOfmaxIndoor = out1(indexOfmaxIndoor);%20.1

minOutdoor = min(M,[],'all'); %63
indexOfMinOutdoor = find(M==minOutdoor);%51
timeOfMinOutdoor = tm(indexOfMinOutdoor);%5

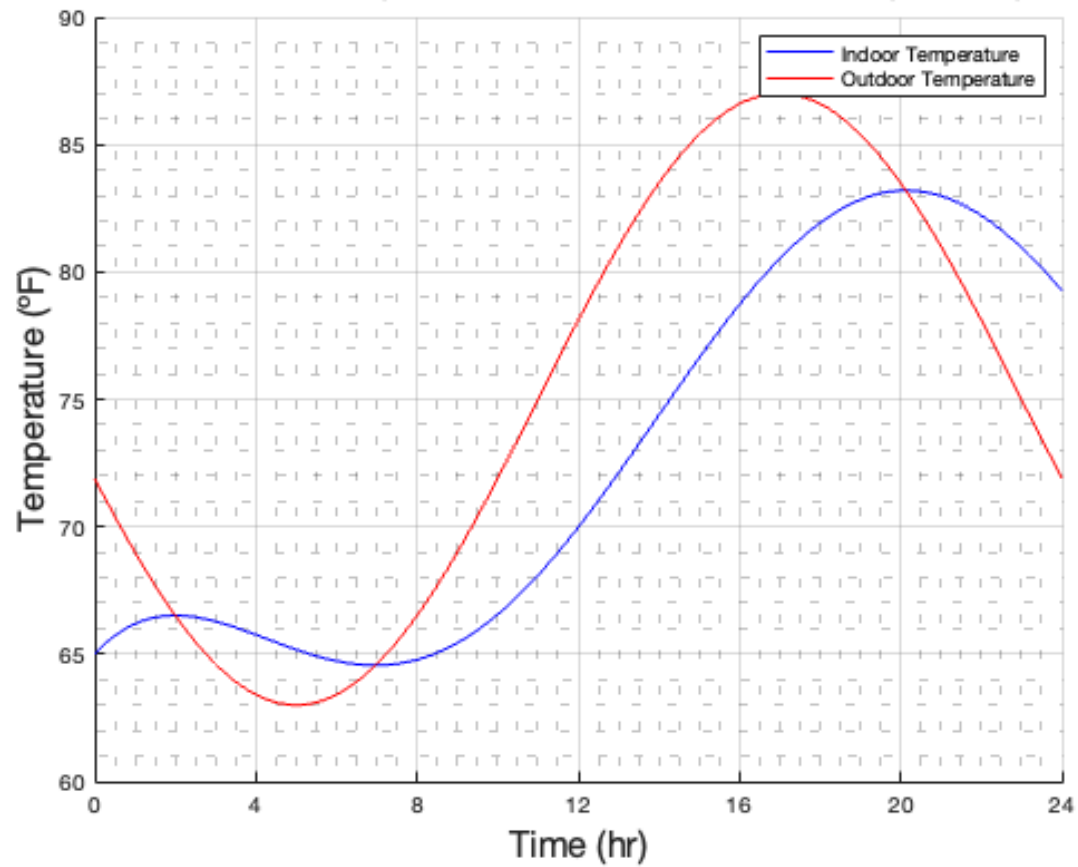
minIndoor = min(out2,[],'all');%64.5601
indexOfMinIndoor = find(out2==minIndoor);%71
timeOfMinIndoor = out1(indexOfMinIndoor);%7

function f = differential(t,T);
f=0.25*(75-12*cos(pi*(t-5)/12)-T);
end

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Temperature over time with varying outside temperature, with no other heating or cooling, and  $M_0 = 75$



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