CHEN 3600 Spring 2012 - Exam 2 SOLUTIONS

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Default Initialization

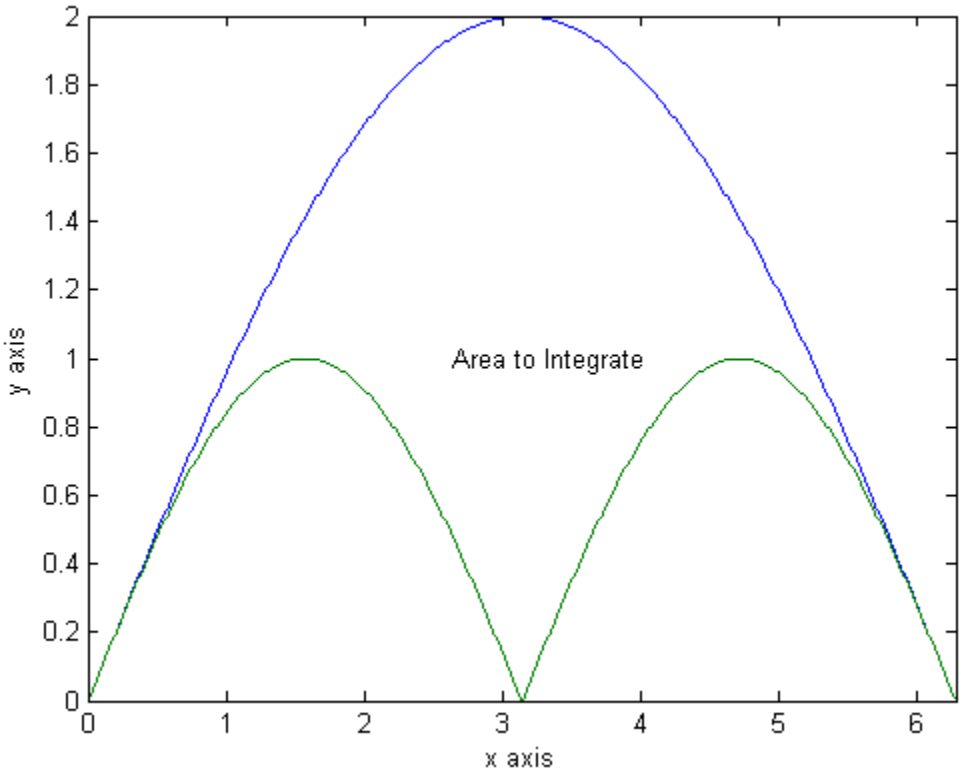
Leave this code here

```
clear all; clc; close all force; format compact; format short;
```

Problem 1:(15 Pts) Partial Credit

```
clc;
x = linspace(0,2*pi,401);
f1 = @(x) 2*sin(x/2);
f2 = @(x) abs(sin(x));
plot(x, f1(x), x, f2(x));
axis ([0, 2*pi, 0, 2]);
xlabel('x axis');
ylabel('y axis');
text (pi-0.5, 1, 'Area to Integrate');
fun = @(x) f1(x)-f2(x);
area = quad(fun, 0, 2*pi)
```

```
area =
    4.0000
```



Problem 2:(15 Pts) No Partial Credit

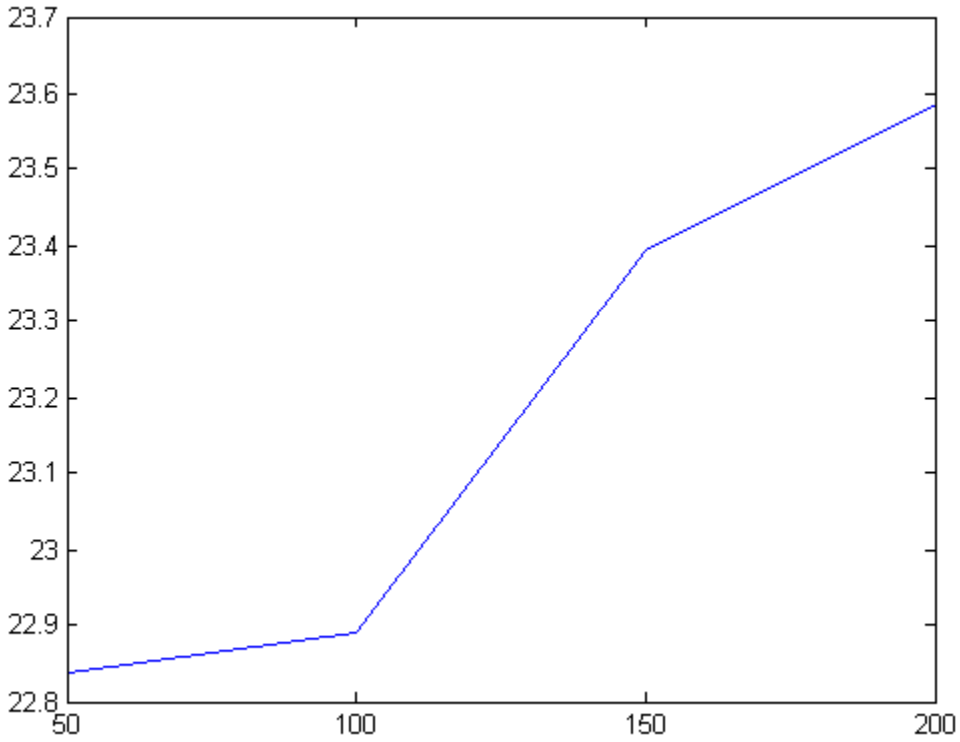
```
clc;
E  =  9.4737e+004;
A  =  2.0670e+029;
hr=100;
tend=1233;          % temp at end of firing
tbegin=tend-100;    % temp at beginning of HW phase
T = @(t) tbegin+t*hr;
Arrhenius = @(t) A*exp(-E./(T(t)+273.15));
HW1 = quad(Arrhenius, 0, 100/hr)
tbegin=tend-150;    % temp at beginning of HW phase
T = @(t) tbegin+t*hr;
Arrhenius = @(t) A*exp(-E./(T(t)+273.15));
HW2 = quad(Arrhenius, 0, 150/hr)
diff_percent = (HW2-HW1)/HW1*100


HW1 =
   22.8899
HW2 =
   23.1024
diff_percent =
    0.9284
```

Problem 3:(15 Pts) No Partial Credit

```
clc;
```

```
E  =  9.4737e+004;
A  =  2.0670e+029;
tcase=[1217, 1233, 1243, 1250]
rcase=[50, 100, 150, 200]
for k=1:4
tend=tcase(k);          % temp at end of firing
tbegin=tend-100;
hr=rcase(k);
T = @(t) tbegin+t.*hr;
Arrhenius = @(t) A*exp(-E./(T(t)+273.15));
HWcase(k) = quad(Arrhenius, 0, 100/hr);
end
HWcase
%
% now see what's up
plot(rcase,HWcase)
P=polyfit(rcase,HWcase,1)
R=corrcoef(rcase,HWcase);
R(1,2)
```

```
tcase =
        1217        1233        1243        1250
rcase =
    50   100   150   200
HWcase =
   22.8375   22.8899   23.3943   23.5843
P =
    0.0055   22.4902
ans =
    0.9576
```



Problem 4:(15 Pts) No Partial Credit

```
clc;
E  =  9.4737e+004;
A  =  2.0670e+029;
hr=50;
tend=1217;          % temp at end of firing
tbegin=tend-100;    % temp at beginning of HW phase
T = @(t) tbegin+t*hr;
Arrhenius = @(t) A*exp(-E./(T(t)+273.15));
HW1 = quad(Arrhenius, 0, 100/hr)
T = @(t) (tbegin+t*hr)*1.0075   % assume temp 0.75% higher (C)
Arrhenius = @(t) A*exp(-E./(T(t)+273.15));
HW2 = quad(Arrhenius, 0, 100/hr)
percent_change=(HW2-HW1)/HW1*100


HW1 =
   22.8375
T =
    @(t)(tbegin+t*hr)*1.0075
HW2 =
   33.7781
percent_change =
   47.9065
```

Problem 5:(15 Pts) Partial Credit

Continuous Probability Question

```
clc;
m=4.8;
sd=0.6;

% (part a) between 1 and 2 sigma
prob_a = normcdf(2,0,1)-normcdf(1,0,1)

% (part b) 90 percentile
cl90=norminv(0.90,m,sd)

% (part c) two-part problem
prob_greater=1-normcdf(5.2,m,sd)
prob_nomorethan3of5 = binocdf(3,5,prob_greater)


prob_a =
    0.1359
cl90 =
    5.5689
prob_greater =
    0.2525
prob_nomorethan3of5 =
    0.9838
```

Problem 6:(15 Pts) Partial Credit

Discrete Simulation Question

```
clc;
format compact
for k=1:10
    rolls(k)=rollum();
end
avg_rolls_sim = mean(rolls)
prob_expect = (1/6)
expected_rolls_theory = 6*(1/prob_expect)


avg_rolls_sim =
   36.6000
prob_expect =
    0.1667
expected_rolls_theory =
    36
```

Problem 7:(10 Pts) Partial Credit

Discrete Distribution Question

```
clc;
r = 46/7;
prob_additional = 1-poisscdf(9,r)


prob_additional =
    0.1288
```

External Function Files

function [rolls] = rollum( ) rolls=0; for k=1:6 matched=false; while ~matched rolls=rolls+1; if randi(6)==k matched=true; end end end end

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