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%DESC: FINAL TEST

%filename: final.m

%% Question 1

% Write a program to animate and trace the function:

y = -2t + 1.5 for t=[-10, 10];

n = 100;

%t = -10:n:10;

t = linspace(-10, 10, n);

y = -2\*t(1:n) + 1.5;

axis([-10 10 -25 25]);

for it = 1:n

plot(t(1:it), y(1:it));

axis([-10 10 -25 25]);

title('Question 1a')

drawnow

end

%% Question 1b

Find int(y,x) from x=[0 4] using composite simpson 1/3

syms x;

fun = @(x)x\*exp(2\*x);

n = 10;

a = 0; x0 = a;

b = 4;

h = (b-a)/n;

for i=1:n

val = val + simpson\_comp(fun, x0, h);

x0 = x0 + h;

end

% using this defined in simpson\_comp.m

% function [Y1] = simpson\_comp(Y, x0, h)

% syms x;

%

% A = h\*(1/3);

% x1 = x0;

% x2 = x0+0.5\*h;

% x3 = x0+h;

%

% k1 = Y(x1);

% k2 = Y(x2);

% k3 = Y(x3);

%

% Y1 = A\*(k1 + 2\*k2 + k3);

% end

%OUTPUT: 1.1332e+04

%% Question 1c

% Find the roots, max and min for the following function using newton

% rraphson method

syms x;

fun = @(x) -2\*x^3 - 3\*x^2 + 0.5;

tolerance = 0.01;

figure(1);

ezplot(fun); title('fun = -2\*x^3 - 3\*x^2 + 0.5');

axis = ([-200 20 -20 20]);

fdiffx = diff(fun,x);

x0 = 2;

OK=1; i = 1; error = 100;

while(OK)

x1 = x0 - (subs(fun,x,x0)/subs(fdiffx,x,x0));

error = abs((x0-x1)/x1)\*100;

if(error<tolerance) OK = 0; end

i = i+1;

x0 = x1;

end

fprintf('\nGreat! Your root is %f, and has an error of %f\n\n', x0, error);

%OUTPUT:

%Great! Your root is 0.366025, and has an error of 0.03%

% NOT DONE EDITING FOR MAX/MIN

% MATLAB FUNCTION FREEZING ON 'tolerance = 0.5'...

tolerance = 0.5;

start = 2;

x0 = start;

OK=1; i = 1; error = 100;

while(OK)

x1 = x0 - (subs(df,x,x0)/subs(ddf,x,x0));

error = abs((x0-x1)/x1)\*100;

if(error<tolerance) OK = 0; end

i = i+1;

x0 = x1;

end

fprintf('\nGreat! Your max/min is %f, and has an error of %f\n\n', x0, error);