Since Canvas doesn't support MATLAB .m files

% HW1 - Problem 1

% Christopher Bero

% CPE 381

% Store 80 Minutes

store\_minutes = 80;

seconds\_per\_minute = 60;

% a)

sample\_hz = 8000;

bits\_sample = 8;

space\_a = sample\_hz\*bits\_sample\*store\_minutes\*seconds\_per\_minute;

% b)

sample\_hz = 44100; % 44.1K Hz sampling frequency

bits\_sample = 8; % 8 bits per sample

tracks = 2; % stereo

space\_b = sample\_hz\*bits\_sample\*tracks\*store\_minutes\*seconds\_per\_minute;

% c)

space\_c = (space\_b / 20.0);

% d)

video = (640 \* 480);

colors = 3;

bits\_color = 8;

sample\_hz = 30;

space\_d = (video\*colors\*bits\_color\*sample\_hz\*seconds\_per\_minute\*store\_minutes);

% HW1 Problem 2

% Christopher Bero

% CPE 381

% Setup x axis and sampling rate

p2\_x\_a = 0:0.0001:3;

p2\_x\_t01 = 0:0.1:3;

p2\_x\_t05 = 0:0.5:3;

p2\_x\_t10 = 0:1.0:3;

% Setup y(x)

p2\_y\_a = (2\*cos(p2\_x\_a\*2\*pi));

p2\_y\_t01 = (2\*cos(p2\_x\_t01\*2\*pi));

p2\_y\_t05 = (2\*cos(p2\_x\_t05\*2\*pi));

p2\_y\_t10 = (2\*cos(p2\_x\_t10\*2\*pi));

% Plot all y(x)

figure('Name', 'This is indeed a figure', 'NumberTitle', 'off')

subplot(2,2,1);

plot(p2\_x\_a, p2\_y\_a);

hold all

%stem(p2\_x\_a, p2\_y\_a);

xlabel('x(t)');

ylabel('y()');

title('analog');

subplot(2,2,2);

plot(p2\_x\_a, p2\_y\_a);

hold all

stem(p2\_x\_t01, p2\_y\_t01);

xlabel('x(t)');

ylabel('y()');

title('T=0.1');

subplot(2,2,3);

plot(p2\_x\_a, p2\_y\_a);

hold all

stem(p2\_x\_t05, p2\_y\_t05);

xlabel('x(t)');

ylabel('y()');

title('T=0.5');

subplot(2,2,4);

plot(p2\_x\_a, p2\_y\_a);

hold all

stem(p2\_x\_t10, p2\_y\_t10);

xlabel('x(t)');

ylabel('y()');

title('T=1.0');

% Analog information lost after Ts=0.5 sec.

% HW1 Problem 3

% Christopher Bero

% CPE 381

% MATLAB instructs me to replace i and/or j with (1i).

p3\_z = (1+((1i)\*1));

p3\_w = exp(p3\_z);

p3\_a=log(p3\_w);

% 1.000000000000000 + 1.000000000000000i

% b)

% real: 1.0

% imag: 1.0i

p3\_c=p3\_w+(conj(p3\_w));

% 2.937387879831771

p3\_d1=abs(p3\_w);

% 2.718281828459046

p3\_d2=angle(p3\_w);

% 1

p3\_e=square(abs(log(p3\_w)));

% 1

% f)

% e^(j1) = (cos(1) + jsin(1))

% (x^2)\*(x^3) = x^5 = x^(2+3)

% w = (e^(1+j1)) = (e^(1) \* e^(j1))

% w = e^(1)\*(cos(1) + jsin(1))

% (cos(1) + jsin(1)) = w/(e^(1))

% cos(1) = w/(e^1) – jsin(1)

% problem 5

A=1.0;

Omega=(2\*pi);

x\_axis=-3:0.01:3;

y\_t=A\*sin(Omega\*x\_axis);

x\_t=A\*cos(Omega\*x\_axis);

z\_t=y\_t + x\_t;

plot(x\_axis, y\_t);

hold all

plot(x\_axis, x\_t);

hold all

plot(x\_axis, z\_t);

% p4\_a

% Yes, the graph shows how a phasor will allow the functions to act

% interchangeably. It would take -(pi/2) radians to shift sine to match

% cosine.

% p4\_b

% The phasor for z\_t is -(pi/4) to relative to cosine

% problem 7

x\_axis=-10:0.1:10;

x\_t = exp(-(abs(x\_axis)));

abs\_x\_t = abs(x\_t);

%plot(x\_axis, x\_t);

%hold all

%plot(abs\_x\_t);

%hold all

%plot(square(abs\_x\_t));

% p7\_a

% The integral is infinite because the function is based upon e^(x).

% p7\_c

y\_t = exp(-x\_axis)\*cos(2\*pi\*x\_axis)\*x\_t;

plot(x\_axis, y\_t);

% problem 8

x\_axis = -5:0.01:5;

x\_t = cos(2.\*2.\*pi.\*x\_axis) + 2.\*cos(2.\*pi.\*x\_axis);

plot(x\_axis, x\_t);

% a)

% T0 = 1s

% from pg 85

fun = @(x) square(cos(2.\*2.\*pi.\*x) + 2.\*cos(2.\*pi.\*x));

q = (1/(1))\*integral(fun, 0, 1);

% b)

% P(q) = -0.238563468046797

fun\_a = @(x) square(cos(2.\*pi.\*x));

q\_a = (1/(1))\*integral(fun\_a, 0, 1);

% q\_a = 1.613811758020811e-11

fun\_b = @(x) square(cos(2.\*cos(pi.\*x)));

q\_b = (1/(1))\*integral(fun\_b, 0, 1);

% q\_b = 0.150167170794685

% P(q) != q\_a + q\_b

% HW1 problem 9

% Christopher Bero

x\_axis = -5:0.01:5;

x\_1t = (4\*cos(pi\*x\_axis));

x\_2t = (-sin((3\*pi\*x\_axis)+(pi/2)));

plot(x\_axis, x\_1t); % a) T1t=2s

hold all

plot(x\_axis, x\_2t); % a) T2t=0.66s

hold all

plot(x\_axis, (x\_1t + x\_2t)); % b) yes, Txt=2s

%p9\_c: T=12

%p9\_d:

x\_1t = (4\*cos(2\*pi\*x\_axis));

x\_2t = (-sin((3\*pi\*x\_axis)+(pi/2)));

hold all

plot(x\_axis, (x\_1t + x\_2t)); % yes

x\_1t = (4\*cos(2\*x\_axis));

x\_2t = (-sin((3\*pi\*x\_axis)+(pi/2)));

hold all

plot(x\_axis, (x\_1t + x\_2t)); % yes