

## Replacement Assignment 2

100 Points (Due: 5:00PM Monday December 12, 2016)

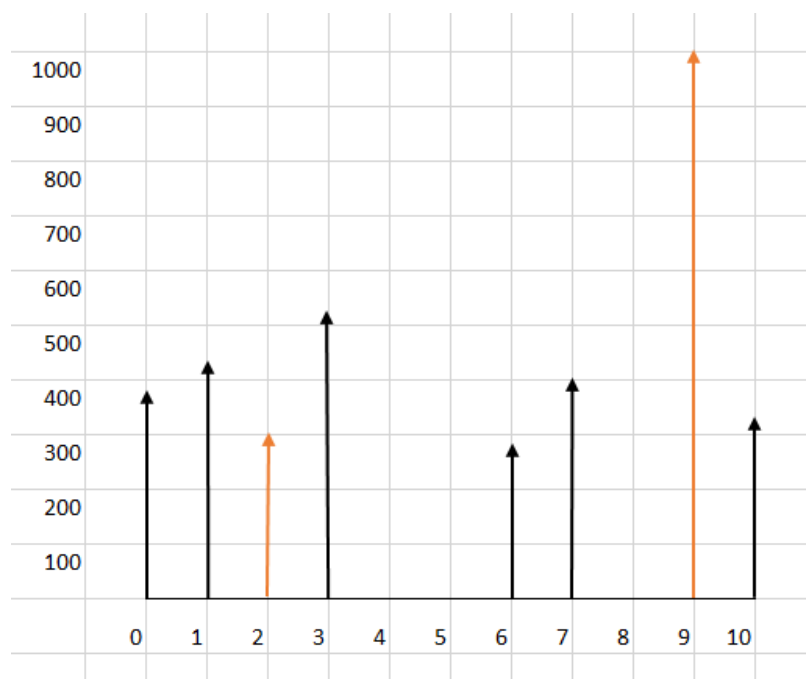
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### PROBLEM #1: (50 points)

Income of a project over a 10-year period is given in the table below.

Year	End of Year Payment
0	380
1	420
2	Last 3 digit of your student ID
3	510
4	0
5	0
6	290
7	400
8	0
9	Last 3 digits of your birth year
10	320

For the interest rate of 12% compounded annually, plot the cash flow diagram and perform the following steps for the project:



In the above solution I assumed the “last 3 digits of student ID” to 300 and the “last 3 digits of birth year” to be 995. Note that I have drawn the arrows proportionally to their values.

**1. Calculate the present worth of the project using formulas for factors.**

We have a number of payments in different years. We need to bring them to the present time (year 0). The first payment is already at year 0. The second payment is at year 1. To find its present worth we need to use the formula (interest rate is 12%):

$$P = F (1 + i)^{-n} = F (1.12)^{-n}$$

For example, for the payment in year 6 which is \$290, we will have:

$$P = 290 (1.12)^{-6} = 290 (0.506631) = \$146.92$$

The rest of the calculations are similar and presented in the table below with the overall result to be \$2146.87.

$i = 0.12$
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YR	Payment	$P = F (1+i)^{-N}$	Present Worth
0	380	1.000000	380.00
1	420	0.892857	375.00
2	300	0.797194	239.16
3	510	0.711780	363.01
4	0	0.635518	0.00
5	0	0.567427	0.00
6	290	0.506631	146.92
7	400	0.452349	180.94
8	0	0.403883	0.00
9	995	0.360610	358.81
10	320	0.321973	103.03

**2146.87**

**2. Calculate the present worth of the project using tables for factors and compare with answer in in part 2. Explain the reason for difference, if any.**

We will use the table for 12%

12%						
Compound Interest Factors						
Single Payment			Uniform Payment Series			
n	Compound Amount Factor Find F Given P	Present Worth Factor Find P Given F	Sinking Fund Factor Find A Given F	Capital Recovery Factor Find A Given P	Compound Amount Factor Find F Given A	Present Worth Factor Find P Given A
	F/P	P/F	A/F	A/P	F/A	P/A
1	1.120	.8929	1.0000	1.1200	1.000	0.893
2	1.254	.7972	.4717	.5917	2.120	1.690
3	1.405	.7118	.2963	.4163	3.374	2.402
4	1.574	.6355	.2092	.3292	4.779	3.037
5	1.762	.5674	.1574	.2774	6.353	3.605
6	1.974	.5066	.1232	.2432	8.115	4.111
7	2.211	.4523	.0991	.2191	10.089	4.564
8	2.476	.4039	.0813	.2013	12.300	4.968
9	2.773	.3606	.0677	.1877	14.776	5.328
10	3.106	.3220	.0570	.1770	17.549	5.650

Using the factor values from the table we should get very close values. Because, values in the table are just rounded off after the fourth decimal. Find the (P/F, I, n) values from the table and calculate using  $P = F (P/F, I, n)$  calculate the present worth of each payment. In this case the overall result has not changed.

YR	Payment	(P/F, I, n)	Present Worth
0	380	1.0000	380.00
1	420	0.8929	375.02
2	300	0.7972	239.16
3	510	0.7118	363.02
4	0	0.6355	0.00
5	0	0.5674	0.00
6	290	0.5066	146.91
7	400	0.4523	180.92
8	0	0.4039	0.00
9	995	0.3606	358.80
10	320	0.3220	103.04

**2146.87**

### 3. Calculate future worth of the project at the end of year 10 using tables.

In calculating present worth finding  $n$  is simple. It is the year that the payment is occurred. For example, if payment occurred at the end of year 6, then  $n=6$ . For future worth you actually have to count. For example, if payment occurred at the end of year 6, and you wanted to calculate the future value at the end of year 10, then check to see how many years are between them:

year 6        set to 0  
 year 7        set to 1  
 year 8        set to 2  
 year 9        set to 3  
 year 10       set to 4

Which make  $n=6$  (or just use  $10-6=4$ ). So future worth of \$290 at year 10 is  
 $F = P (F/P, I, n) = 290 (1.574) =$

The calculations are provided below.

YR	Payment	(F/P,I,n)	Future Worth
0	320	1.0000	320.00
1	995	1.1200	1114.40
2	0	1.2540	0.00
3	400	1.4050	562.00
4	290	1.5740	456.46
5	0	1.7620	0.00
6	0	1.9740	0.00
7	510	2.2110	1127.61
8	300	2.4760	742.80
9	420	2.7730	1164.66
10	380	3.1060	1180.28
			<b>6668.21</b>

**4. Calculate future worth of the project at the end of year 5 using the calculated value in part 3.**

We know that future worth of the project at the end of year 10 is \$6668.21. We can use this value and use its present worth at the end of year 5. To do that it is enough to calculate:

$$P = F (P/F, 12\%, 5) = \$6,668.21 (0.5674) = \$3,783.54$$

N=5 was calculated by either counting the years or by  $10-5=5$ .

**5. Calculate the equivalent annual payment of the project over 10 years.**

We can use either the value of the future worth of the project at year 10 or present worth of the project at year 0 and find A. Below are both methods

$$A = P (A/P, 12\% \text{ and } 10) = \$2,146.87 (0.1770) = \$379.99$$

$$A = F (A/F, 12\%, 10) = \$6,668.21 (0.0570) = \$380.08$$

The 9 cent difference is due to round off errors.

**PROBLEM #2:** (25 points)

Using Notepad, write a html document with the following design:

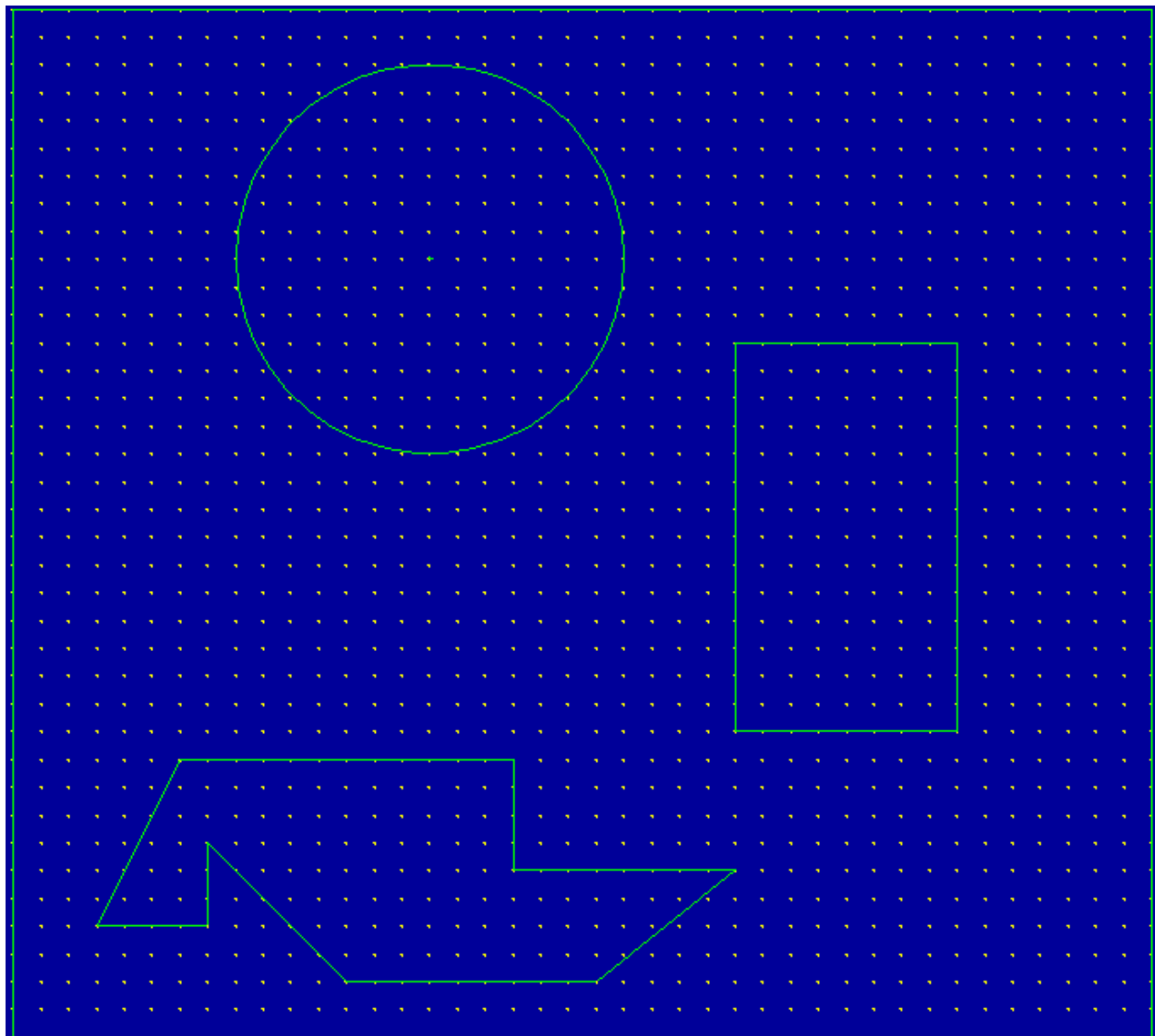
File name: ramap.html

Background color: full red + no green + full blue

Text: Click on any shape to go to a different web site.

Image: MyShapes.jpg located at the same folder that ramap.html is located

The general shape of the image is:



Note that you cannot use the image above directly to find the coordinates for MAP. Here is how to find them:

The distance between any two yellow dots is 10 pixels. So you actually have count the dots to find out the coordinates. For example, to find out the coordinate of the upper-right corner of the rectangle begin counting from (0,0) point. The corner point is 34 pixels to the right away and 12 pixels down. So, the coordinate of the point is (340, 120). Both image and text should be centered. The text should be below the images.

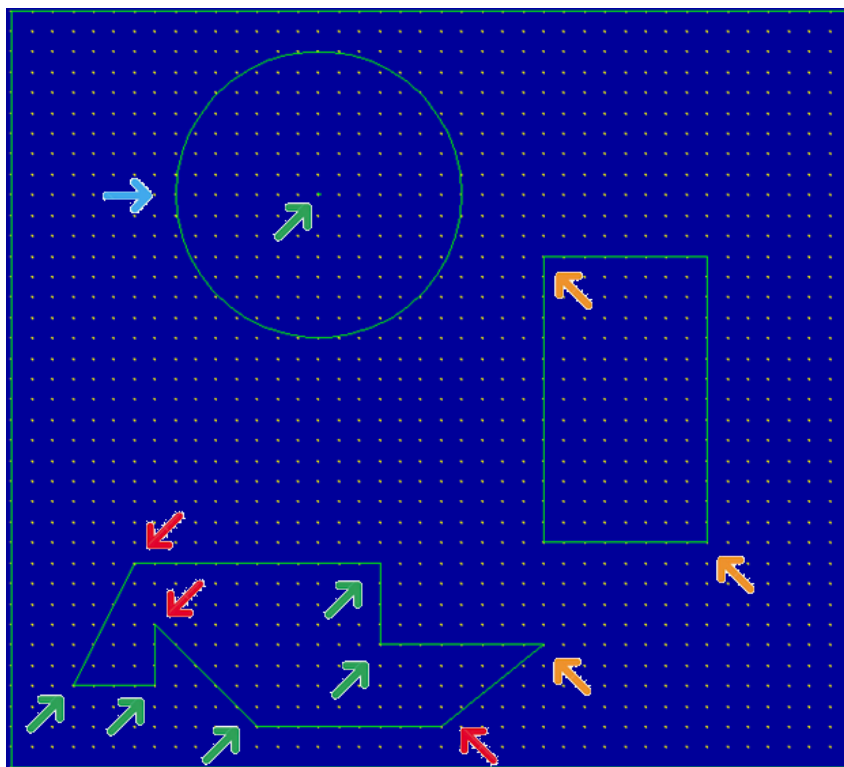
**Solution:**

The first thing that we need to do is to find the coordinates of the points needed for the map. For the circle we need the coordinates of the center and the radius. We can find the coordinate of the center by counting and for the radius we can count from the center to the end of the vertical or horizontal radius line on the circle.

Center: (150, 90)                  Radius: 70

For the rectangle: (260, 120) and (340, 260)

For the polygon: (30, 330), (70, 330), (70, 300), (120, 350), (210, 350), (260, 310), (180, 310), (180, 270), (60, 270)



The html document in the Notepad will be:

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```
<html>
<head>
<title></title>
</head>

<body bgcolor="#ff00ff">
<center><p>
<IMG SRC="MyShapes.jpg" USEMAP="#blueshape" BORDER=0 WIDTH=410
HEIGHT=370></P>
<p>Click on any shape to go to a different web site.</p></center>

<MAP NAME="blueshape">
<AREA SHAPE=CIRC COORDS="150,90,70" HREF="http://www.google.com/"
ALT="">
<AREA SHAPE=RECT COORDS="260,120,340,260" HREF="http://www.bing.com/"
ALT="">
<AREA SHAPE=POLY
COORDS="226,38,238,35,261,62,269,61,267,38,279,35,280,43,272,48,273,67,260
,68,238,47,226,45,226,38" HREF="http://www.handle.com/" ALT="">
<AREA SHAPE=POLY
COORDS="30,330,70,330,70,300,120,350,210,350,260,310,180,310,180,270,60,2
70" HREF="http://www.yahoo.com/" ALT="">
</MAP>

</body>
</html>
```

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That must be saved as ramap.html



**PROBLEM #3:** (25 points)

Write a C++ program that when you run it you will get the results shown below. Red items are user input, yellow ones are the ones that computer processes based on your input and white ones are computer statements.

```
Hello,  
I am Computer. What is your name?  
John  
Nice to meet you John. What is the first digit of your phone number  
from the left?  
4  
Thank you. What is the second digit of your phone number from the  
left?  
4  
That is great. Could you please enter the third digit of your phone  
number from the left?  
3  
Wow! 443.  
Did you know that if you add those digits you will get 11?  
If you multiply them, you will get 48.  
Also, if you divide 443 by 48 you will get 9.229.  
Aren't you impressed?  
yes  
Good bye John
```