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start

www.pgrocer.net/Cis17/incla

In Class Exercise on loops and if st

These are unrealistic problems, but they help to r ough to completion.

Problems #1:

pseudocode

```
start
   firstNum = 100
   secondNum = 5
   thirdNum = 12
   the Result = 0
   do while secondNum <= thirdNum
        if firstNum > 500
             firstNum = firstNum * 2
             secondNum = secondNum +1
        else
             firstNum = firstNum + 100
             thirdNum = thirdNum -1
        end if
   end while loop
   theResult = firstNum + secondNum + thirdNum
   display theResult
end
```

Problem #2:

```
start
   firstNum = 25
   secondNum = 50
   thirdNum = 75
   fourthNum = 100
   ct = 0
   workAns = 0
   theAns = 0
   do while ct < 6
       workAns = firstNum + secondNum
```

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http://www.pgrocer.net/Cis17/exar

view-source:http://www.pgrocer.ne

```
1  <html>
2  <head>
3  <title>JavaScript exercise</title>
4  </head>
5  <body>
6  <script type="text/javascript">
7      firstNum = 100;
8      secondNum = 5;
9      thirdNum = 12;
10     theResult = 0;
11     while (secondNum <= thirdNum)
12      {
13       if (firstNum > 500)
14        {
15          firstNum = firstNum * 2;
16          secondNum = secondNum + 1;
17        }
18       else
19        {
20          firstNum = firstNum + 100;
21          thirdNum = thirdNum - 1;
22        }
23      }
24     theResult = firstNum + secondNum + thirdNum;
25     document.write(theResult);
26 </script>
27 </body>
28 </html>
```

var

Better to use var when you define the variables.

Using the while - depending on the values assigned - you might not enter the loop.

SMART Ink

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JavaScript exercise | http://www.pgrocer.net/Cis17/exan

view-source:http://www.pgrocer.net/Cis17/examples/aa

```
<html>
<head>
<title>JavaScript exercise</title>
</head>
<body>
<script type="text/javascript">
   firstNum = 100;
   secondNum = 5;
   thirdNum = 12;
   theResult = 0;
   do
      {
       if (firstNum > 500)
          {
             firstNum = firstNum * 2;
             secondNum = secondNum + 1;
           }
       else
           {
             firstNum = firstNum + 100;
             thirdNum = thirdNum - 1;
           }
       } while (secondNum <= thirdNum);
    theResult = firstNum + secondNum + thirdNum;
    document.write(theResult);
</script>
</body>
</html>
```

This uses the do with the while at the bottom which means the loop always gets executed at least once.

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JavaScript exercise

www.pgrocer.net/Cis17/examples/aaexamples/jsprob2a

132430

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start

www.pgrocer.net/Cis17/inclass/loopi

```
   theResult = firstNum + secondNum + thirdNum
   display theResult
end

Problem #2:

start
   firstNum = 25
   secondNum = 50
   thirdNum = 75
   fourthNum = 100
   ct = 0
   workAns = 0
   theAns = 0
   do while ct < 6
       workAns = firstNum + secondNum
       if workAns > thirdNum
            fourthNum = fourthNum / 2
            firstNum = firstNum * 3
            secondNum = firstNum - secondNum
            thirdNum = thirdNum *2
       else
            firstNum = firstNum + 10
            secondNum = secondNum + 10
            thirdNum = thirdNum + 10
       end if
       ct = ct + 1
    end do
    theAns = firstNum + secondNum * thirdNum + fourthNum
    display theAns
 end
```

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http://www.pgrocer.net/Cis17/exa

view-source:http://www.pgrocer.ne

Capture to new pag

```
4  </head>
5  <body>
6  <script type="text/javascript">
7     firstNum = 25;
8     secondNum = 50;
9     thirdNum = 75;
10    fourthNum = 100;
11    ct = 0;
12    workAns = 0;
13    theAns = 0;
14    while (ct < 6)
15     {
16        workAns = firstNum + secondNum;
17        if (workAns > thirdNum)
18          {
19             fourthNum = fourthNum / 2;
20             firstNum = firstNum * 3;
21             secondNum = firstNum - secondNum;
22             thirdNum = thirdNum *2;
23          }
24        else
25          {
26             firstNum = firstNum + 10;
27             secondNum = secondNum + 10;
28             thirdNum = thirdNum + 10;
29          }
30        ct = ct + 1;
31     }
32    theAns = firstNum + secondNum * thirdNum + fourthNum;
33    document.write(theAns);
34 </script>
35 </body>
36 </html>
```

var

parseFloat

Safer to use parseFloat when you do an Add.

11:09 AM
3/27/2018

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Basic Array

cisweb.bristolcc.edu/~pgrocer/CIS120/deptArray.html

Check Department

Divison III has four department.

A look at arrays.

Please enter the department number

2

OK Cancel

Transferring data from cisweb.bristolcc.edu...

11:11 AM
3/27/2018

File Edit View History Bookmarks Tools Help

http://cisweb.bristolcc.edu/~pgroc

view-source:http://cisweb.bristolcc.edu/~pgrocer/CIS12

```
<!DOCTYPE html>
<html>
<head>
<meta charset="utf-8">
<title>Basic Array</title>
<style type="text/css">
body
   {
    background-color: beige;
    color: navy;
   }
</style>
<script type="text/javascript">
deptArray = new Array(4);
deptArray[0] = "No Dept 0";
deptArray[1] = "BU";
deptArray[2] = "CI";
deptArray[3] = "CU";
deptArray[4] = "OF";
// I have an array that starts with 0 and ends with 4 so the number when I define
//the array is 4 event though there are 5 elements.  I could eliminate the
// 0th element and it will work the same.
</script>
</head>
<body>
<h1>Check Department</h1>
<p>Divison III has four department.</p>
<script type="text/javascript">
deptNo = prompt("Please enter the department number",2);
if (deptNo < 5)
    {
     document.write("The department is " + deptArray[deptNo]);
    }
else
    {
     document.write("Invalid dept number");
    }
</script>
<h1>The end!</h1>
</body>
</html>
```

I define the array in a script I put in the head. That script could also be within the body.

Here I go to the array where every dept has the same name of deptArray. However when I use an index in square braces then it makes the name unique.

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CIS Basic Array

cisweb.bris

Check Department

Divison III has four department.

The department is CI

The end!

File Edit View History Bookmarks Tools Help

http://cisweb.bristolcc.edu/~pgroc

view-source:http://cisweb.bri

Search

```
1  <!DOCTYPE html>
2  <html>
3  <head>
4  <meta charset="utf-8">
5  <title>Basic Array</title>
6  <style type="text/css">
7  body
8     {
9      background-color: beige;
10     color: navy;
11    }
12 </style>
13 <script type="text/javascript">
14 deptArray = new Array(4);
15 deptArray[0] = "No Dept 0";
16 deptArray[1] = "BU";
17 deptArray[2] = "CI";
18 deptArray[3] = "CU";
19 deptArray[4] = "OF";
20 // I have an array that starts with 0 and ends with 4 so the number when I define
21 //the array is 4 event though there are 5 elements.  I could eliminate the
22 // 0th element and it will work the same.
23 </script>
24 </head>
25 <body>
26 <h1>Check Department</h1>
27 <p>Divison III has four department.</p>
28 <script type="text/javascript">
29 deptNo = prompt("Please enter the department number",2);
30 if (deptNo < 5)
31     {
32      document.write("The department is " + deptArray[deptNo]);
33     }
34 else
35     {
36      document.write("Invalid dept number");
37     }
38 </script>
39 <h1>The end!</h1>
40 </body>
41 </html>
```

Pointer

Index

Subscript

deptArray

0	No Dept 0
1	BU
2	CI
3	CU
4	OF

11:23 AM
3/27/2018

Numbering Systems and Computer Codes
Prepared by The Computer Information Systems Department

Decimal Numbering Systems:
The decimal numbering system is a base 10 numbering system (this means there are 10 digits we can use - these digits are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9). When we talk about a number, we understand what the number is because of its face value and its positional value. Thus, the digit 5 has a different meaning when it is in the tens position than when it is in the ones position (i.e. when it is in the tens position, we express it as 50 and when it is in the ones position, we express it as 5). In this case, the face value of the digit is 5 and the positional value of a number is based on the position it occupies. In decimal, the positional value of a number is based on the powers of 10 (remember, we are in base 10):

5	7	2	4	Face value
10^3	10^2	10^1	10^0	Positional Value (powers of 10)
1000	100	10	1	Resolved positional value

To figure out the value of 5724, we do the following:

$5 \times 10^3 = 5 \times 1000 = 5000$
$7 \times 10^2 = 7 \times 100 = 700$
$2 \times 10^1 = 2 \times 10 = 20$
$4 \times 10^0 = 4 \times 1 = 4$
5724

Binary Numbering systems:
The binary numbering system works much the same way as the decimal numbering system except that now we are in base 2 so we only have 2 digits (0, 1). The value of the number is still determined by the face value times the positional value, but since we are in base 2, the positional values are the powers of 2. Since the face values can only be 0 or 1, this means that the 0 or 1 is multiplied by the positional place in which it is found.
Example: binary number 1011011

1	0	1	1	0	1	1	Face value
2^6	2^5	2^4	2^3	2^2	2^1	2^0	Positional value

Binary Numbering systems:
The binary numbering system works much the same way as the decimal numbering system except that now we are in base 2 so we only have 2 digits (0, 1). The value of the number is still determined by the face value times the positional value, but since we are in base 2, the positional values are the powers of 2. Since the face values can only be 0 or 1, this means that the 0 or 1 is multiplied by the positional place in which it is found.
Example: binary number 1011011

1	0	1	1	0	1	1	Face value
2^6	2^5	2^4	2^3	2^2	2^1	2^0	Positional value
64	32	16	8	4	2	1	Resolved positional value

The positional values are first shown in the powers of 2 and then as the resolved number - in other words, 2 to the 6th is equal to 64.

Converting binary to decimal:
In the previous example to find the decimal equivalent for the number 1011011, we do the following:

$1 \times 2^6 = 1 \times 64 =$	64
$0 \times 2^5 = 0 \times 32 =$	0
$1 \times 2^4 = 1 \times 16 =$	16
$1 \times 2^3 = 1 \times 8 =$	8
$0 \times 2^2 = 0 \times 4 =$	0
$1 \times 2^1 = 1 \times 2 =$	2
$1 \times 2^0 = 1 \times 1 =$	1
	91

Converting decimal to binary:
Before doing this it is important that we review the decimal equivalent for the frequently used powers of 2:

$2^0 = 1$	$2^1 = 2$	$2^2 = 4$	$2^3 = 8$	$2^4 = 16$	$2^5 = 32$
$2^6 = 64$	$2^7 = 128$	$2^8 = 256$	$2^9 = 512$	$2^{10} = 1024$	etc

$$10111_2$$

$2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0$

$16 \quad 8 \quad 4 \quad 2 \quad 1$

$$\begin{array}{r} 16 \\ 4 \\ 2 \\ 1 \\ \hline 23_{10} \end{array}$$

$$11100_2$$

$16 \quad 8 \quad 4 \quad 2 \quad 1$

$$\begin{array}{r} 16 \\ 8 \\ 4 \\ \hline 28_{10} \end{array}$$

$$\begin{array}{r} 1 \\ +1 \\ \hline 10_2 = 2_{10} \end{array} \qquad \begin{array}{r} 9 \\ +1 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 10 \\ 2^1\ 2^0 \\ 2\ 1 \end{array} \qquad \begin{array}{r} 2 \\ +0 \\ \hline 2 \end{array} \qquad \begin{array}{r} 11 \\ 101 \\ +\ 1 \\ \hline 110 = 6_{10} \end{array}$$

$$\begin{array}{r} +\ 1 \\ \hline 11_2 = 3_{10} \end{array}$$

$$\begin{array}{r} 100 \\ 421 \end{array} \qquad \begin{array}{r} +\ 1 \\ \hline 111 = 7_{10} \end{array}$$

$$\begin{array}{r} +\ 1 \\ \hline 100 = 4_{10} \end{array}$$

$$\begin{array}{r} 101 = 5_{10} \\ 421 \end{array} \qquad \begin{array}{r} +\ 1 \\ \hline 1000 = 8_{10} \\ 8421 \end{array}$$

$$\begin{array}{r} +\ 1 \\ \hline 101 = 5_{10} \end{array}$$

Dec	Bin
0	0
1	1
2	10
3	11
4	100
5	101
6	110
7	111
8	1000

$125_{10} = \_\_\_\_\_{}_2$

1	1	1	1	1	0	1
128	64	32	16	8	4	2	1

$$\begin{array}{r} 64 \\ \hline 61 \\ -32 \\ \hline 29 \\ -16 \\ \hline 13 \\ -8 \\ \hline 5 \\ -4 \\ \hline 1 \\ -1 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 2 \\ 64 \\ 32 \\ 16 \\ 8 \\ 4 \\ 1 \\ \hline 125_{10} \end{array}$$

$1111101_2 = 125_{10}$

64 32 16 8 4 2 1

Untitled * - SMART Notebook

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14 Mar 27-11:30 AM

15 Mar 27-11:33 AM

16 Mar 27-11:39 AM

17 Mar 27-11:45 AM

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$125_{10} = \_\_\_\__2$

$$\begin{array}{r} 64 \\ \hline 61 \\ -32 \\ \hline 29 \\ -16 \\ \hline 13 \\ -8 \\ \hline 5 \\ -4 \\ \hline 1 \\ -1 \\ \hline 0 \end{array}$$

1	1	1	1	1	0	1	
128	64	32	16	8	4	2	1

$$\begin{array}{r} 2 \\ 64 \\ 32 \\ 16 \\ 8 \\ 4 \\ 1 \\ \hline 125_{10} \end{array}$$

1	1	1	1	1	0	1	$_2 = \underline{125}_{10}$
64	32	16	8	4	2	1	

Extend Page

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64 32 16 8 4 2 1 Resolved positional value

The positional values are first shown in the powers of 2 and then as the resolved number - in other words, 2 to the 6th is equal to 64.

Converting binary to decimal:
In the previous example to find the decimal equivalent for the number 1011011, we do the following:

$1 \times 2^6 = 1 \times 64 =$	64
$0 \times 2^5 = 0 \times 32 =$	0
$1 \times 2^4 = 1 \times 16 =$	16
$1 \times 2^3 = 1 \times 8 =$	8
$0 \times 2^2 = 0 \times 4 =$	0
$1 \times 2^1 = 1 \times 2 =$	2
$1 \times 2^0 = 1 \times 1 =$	1
	91

1 0 1 1 0 1 1
128 64 32 16 8 4 2 1

91
-64
27
-16
11
-8
3
-2
1
-0

Converting decimal to binary:
Before doing this it is important that we review the decimal equivalent for the frequently used powers of 2:

$2^0 = 1$	$2^1 = 2$	$2^2 = 4$	$2^3 = 8$	$2^4 = 16$	$2^5 = 32$
$2^6 = 64$	$2^7 = 128$	$2^8 = 256$	$2^9 = 512$	$2^{10} = 1024$	etc.

To convert 91 from decimal to binary, you can follow the following steps:

1. Look at 91 and see what power of 2 can be taken from it. The highest power that can be subtracted is 2 to the 6th which is 64. Therefore we put a 1 in the 2 to the 6th position. Then we subtract: 91 - 64 = 27

1	____	____	____	____	____	____
2^6	2^5	2^4	2^3	2^2	2^1	2^0
64	32	16	8	4	2	1

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Numbering Systems and Computer

www.pgrocer.net/Cis17/notes/numbers.html

+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
11	100	101	110	111	1000	1001

This means that when we count, we get the following:

Decimal	Binary
0	000 0
1	000 1
2	00 10
3	11
4	100
5	101
6	110
7	111
8	1000
9	1001
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111
16	10000

4 binary bits

ASCII

8 binary bits

	4	4
	1000	1111
hex	8	F

Hexadecimal Numbering System:

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Numbering Systems and Computer

www.pgrocer.net/Cis17/notes/numbers.html

Binary	Decimal	Hexadecimal
0	0	0
1	1	1
10	2	2
11	3	3
100	4	4
101	5	5
110	6	6
111	7	7
1000	8	8
1001	9	9
1010	10	A
1011	11	B
1100	12	C
1101	13	D
1110	14	E
1111	15	F
10000	16	10
10001	17	11
10010	18	12

hex is base 16

$$\begin{array}{r} {}^{1}\,\mathrm{FF} \\ +\ 1 \\ \hline 100 \end{array} \qquad \begin{array}{r} 9 \\ +\ 1 \\ \hline A \\ +\ 1 \\ \hline B \\ +\ 1 \\ \hline C \\ +\ 1 \\ \hline D \end{array} \qquad \begin{array}{r} D \\ +\ 1 \\ \hline E \\ +\ 1 \\ \hline F \\ +\ 1 \\ \hline 10 \end{array}$$

Conversion from binary to hexadecimal:

Binary Hexadecimal

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Numbering Systems and Compute

www.pgrocer.net/Cis17/notes/numbers.html

Binary	Decimal	Hexadecimal
0	0	0
1	1	1
10	2	2
11	3	3
100	4	4
101	5	5
110	6	6
111	7	7
1000	8	8
1001	9	9
1010	10	A
1011	11	B
1100	12	C
1101	13	D
1110	14	E
1111	15	F
10000	16	10
10001	17	11
10010	18	12

value $1110_2 = 14_{10} = E_{16}$

position 8421

$C_{16} = 1100_2 = 12_{10}$

8421

$10_{10} = 1010_2 = A_{16}$

8421

Conversion from binary to hexadecimal:

Binary Hexadecimal

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Numbering Systems and Computer

www.pgrocer.net/Cis17/notes/numbers.html

1011	B
1100	C
1101	D
1110	E
1111	F

$C9B_{16} = \_\_\_\__2$

As you can see from the chart above, every hexadecimal digit can be represented by 4 binary digits (bits) and every combination of 4 binary digits can be represented by a single hexadecimal digit. Because of this, any string of 4 binary digits can be converted to its hexadecimal equivalent by either checking the chart above or doing the conversion. If I have a string of binary digits, it can be divided into groups of four starting at the far right and each group can be converted to its hexadecimal equivalent.

1010 | 1110 | 0101

8 2 | 8 4 2 | 4 1

10_{10} 14_{10} 5_{10}

A_{16} E_{16} 5_{16}

Examples:

1. 11001111 can be divided into groups of 4

   1100/ 1111 1100 is C and 1111 is F

   C F

   therefore the hexadecimal equivalent of 11001111 is CF

2. the hexadecimal equivalent of 11010101110101 is 3575

   11010101110101 = 11/ 0101/ 0111/ 0101

   3 5 7 5

Note that if there are not enough digits to make groups of 4, then you start at the right and the group with less than 4 digits is the leftmost group Ð in translating that group, assume leading 0s.

Conversion from hexadecimal to binary:

To convert from hexadecimal to binary, you express each hexadecimal character as 4 binary digits Ð either use the chart above or figure out the equivalent.

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Numbering Systems and Computer

www.pgrocer.net/Cis17/notes/numbers.html

1011	B
1100	C
1101	D
1110	E
1111	F

10th is A 12th C 9 B 16 = 11001061 1011 2

1100 1001 8 4 8 1

11th 1011 8421

As you can see from the chart above, every hexadecimal digit can be represented by 4 binary digits (bits) and every combination of 4 binary digits can be represented by a single hexadecimal digit. Because of this, any string of 4 binary digits can be converted to its hexadecimal equivalent by either checking the chart above or doing the conversion. If I have a string of binary digits, it can be divided into groups of four starting at the far right and each group can be converted to its hexadecimal equivalent.

1010 | 1110 | 0101
8 2 | 842 | 4 1
10_{10} 14_{10} 5_{10}
A_{16} E_{16} 5_{16}

Examples:

1. 11001111 can be divided into groups of 4
   1100/ 1111 1100 is C and 1111 is F
   C F
   therefore the hexadecimal equivalent of 11001111 is CF

2. the hexadecimal equivalent of 11010101110101 is 3575
   11010101110101 = 11/ 0101/ 0111/ 0101
   3 5 7 5

Note that if there are not enough digits to make groups of 4, then you start at the right and the group with less than 4 digits is the leftmost group Ð in translating that group, assume leading 0s.

Conversion from hexadecimal to binary:
To convert from hexadecimal to binary, you express each hexadecimal character as 4 binary digits Ð either use the chart above or figure out the equivalent.

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