Hla Myint Myat185923216 hmyat1@mySeneca.ca  
Click or tap here to enter text.

*There are many notes in the instructions to help you earn marks for the questions below.*

Exercise One of Two – **integer overflow** (80 points)

1) 🡺 (7.5 points) If a variable counting hundredths of a second is stored in a signed **long** 32-bit integer,   
how many **days**, to two decimals, will it take until that integer overflows?

It will take around 24.86 days until that integer overflow.

2) 🡺 (15 points) Convert the maximum value of a signed **long** 32-bit integer, representing hundredths of a second, into whole numbers of  
 days : hours : minutes : seconds . hundredths of a second.   
After *n* days, how many hours remain? After *n* hours, how many minutes remain? etc.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **248.5551** | **5965.232** | **357913.941** | **21474836.47** | **2147483647** |
| **DAYS** | **HOURS :** | **MINUTES :** | **SECONDS .** | **HUNDREDTHS** |

3) 🡺 (2.5 points) What are the maximum and minimum values that can be stored in a **short** 16-bit signed integer?

16-bit signed integer maximum = 32767 … minimum = -32768

4) 🡺 (5+5 points) Give examples of two **short** 16-bit signed integers that when added together would cause overflow.

 32767 +  1 are two positive values causing overflow when added together.

-32768 + -1 are two negative values causing overflow when added together.

Binary Search Bug

5) 🡺 (10 points) What is potentially wrong with the **(low + high) / 2** calculation to find the middle point? Under what conditions would the calculation go wrong?

When we calculate (low + high) such as 2147483647 + 2147483647 , the result of this will cross the limit which is 4294967294 which cross the limit of a signed 32 bit integer. To avoid these kind of overflow, we can use a larger int type .

6) 🡺 (10 points) REWRITE themidcalculation to prevent overflow*from*mid = (low + high) / 2;*to*  **mid = low + (high - low) /2 ;**

7) 🡺 (25 points)Write a 250+ word “reflection”(similar to a workshop in your programming class) describing the steps you used to develop and test your solution to the calculation bug.

Exercise Two of Two – **Numbering Systems and Conversions (20 points)**

8) 🡺 (10 points ) What is the hex value for these colours?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Red decimal | Green decimal | Blue decimal | Hex triplet | Colour Description |
| 15 | 245 | 231 | #0FF5E7 | Bright light greenish blue |
| 192 | 255 | 238 | #0FF5E7 | Bright light greenish blue |
| 208 | 13 | 30 | #D00D1E | Bright warm red orange |
| 186 | 187 | 30 | #BABB1E | Warm yellow green |
| 126 | 164 | 112 | #7EA470 | Muted earthy greenish yellow |

9) 🡺 (10 points)Fill in this chart as per the column headings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hex triplet | Red decimal | Green decimal | Blue decimal | Describe the Final Colour *and* change the cell's background colour, i.e. R-click and see MS Word 'Shading' |
| #302432 | 48 | 36 | 50 | Dark, rich blue purple |
| #204C02 | 32 | 76 | 2 | Dark Green |
| #D64A53 | 214 | 74 | 83 | Bright, warm pink |
| #404891 | 64 | 72 | 145 | Dark, cool blue purple |