Lab: 05

Department of Computer Science
Iqra University Islamabad

Computer Organization and Assembly Language

Maqsood Ahmed

ID: 38186

Program: Integer Data Definitions

```assembly
TITLE Integer Data Definitions (File:IntegerDef.asm)

; Examples Demonstrating Integer Data Definition

.686
.MODEL flat, stdcall
.STACK

INCLUDE Irvine32.inc

.data
; ---------------- Byte Values ---------------------
byte1  BYTE    'A'         ; 'A' = 65 = 41h
byte2  BYTE    0           ; smallest unsigned byte value
byte3  BYTE    255         ; largest unsigned byte value
byte4  SBYTE   -128        ; smallest signed byte value
byte5  SBYTE   +127        ; largest signed byte value
byte6  BYTE    ?           ; uninitialized

; ---------------- Word Values ---------------------
word1  WORD    65535       ; largest unsigned word value
word2  SWORD   -32768      ; smallest signed word value
word3  WORD    ?           ; uninitialized

; -------------- DoubleWord Values ----------------
dword1 DWORD   0FFFFFFFFh ; largest unsigned value in hex
dword2 SDWORD  -2147483648 ; smallest signed value in decimal

; -------------- QuadWord Value -------------------
quad1  QWORD   0123456789ABCDEFh

.code
main PROC
    ; No instructions to execute
    exit
main ENDP
END main
```

Observing Variables in the Watch Window

To fill in the table, you would run the program in the debugger, add each variable to the Watch window, and observe their memory locations and values.

Expected Table

```plaintext
Name     Location (hex)  Value (hex)   Value (decimal)
----------------------------------------------------
byte1    00404000        41            65
byte2    00404001        00            0
byte3    00404002        FF            255
byte4    00404003        80            -128
byte5    00404004        7F            127
byte6    00404005        ??            ??
word1    00404006        FFFF          65535
word2    00404008        8000          -32768
word3    0040400A        ??            ??
dword1   0040400C        FFFFFFFF      4294967295
dword2   00404010        80000000      -2147483648
quad1    00404014        0123456789ABCDEF  81985529216486895
```

Total Number of Bytes Allocated for Data

To determine the total number of bytes allocated, count the sizes of each variable:

- **BYTE**: 1 byte each for byte1, byte2, byte3, byte4, byte5, byte6.
  - Total: 6 bytes
- **WORD**: 2 bytes each for word1, word2, word3.
  - Total: 6 bytes
- **DWORD**: 4 bytes each for dword1, dword2.
  - Total: 8 bytes
- **QWORD**: 8 bytes for quad1.
  - Total: 8 bytes

Summing these up:

- 6 bytes (BYTEs) + 6 bytes (WORDs) + 8 bytes (DWORDs) + 8 bytes (QWORD) = **28 bytes**