Worksheet 9

Due: April 27th 2016 (Wednesday) in class

1. A computer has the following characteristics:
   a. 4GB Virtual Address Space
   b. 2GB Physical Address Space
   c. Page Size (P) = 4KB

   How many **bits** are required to specify the following?

   If you do not have enough information to answer the question, say "Not Enough Info".

   Virtual Page Number (VPN): _____

   Physical Page Number (PPN): _____

   Virtual Page Offset (VPO): _____

   Physical Page Offset (VPO): _____

   Maximum number of Page Table Entries (PTE) per process: _____

   Number of page table entries (PTE) in TLB: _____

   Swap space (in bytes): _____

2. Determine the **minimum block size** for each of the following combinations of alignment requirements and block formats.

   Assumptions:
   1. Explicit free list
   2. 4-byte prev and next pointers in each free block
   3. zero-sized payloads are not allowed

4. headers and footers are stored in 4-byte words.
5. Block size = sizeof (header) + sizeof (payload) + sizeof (padding) + sizeof (footer)

Alignment	Allocated Block	Free Block	Minimum block size (bytes)
Single Word	Header and Footer	Header and Footer	
Single Word	Header but no footer	Header and Footer	
Double Word	Header and Footer	Header and Footer	
Double Word	Header but no footer	Header and Footer	

3. Determine the **maximum block size** for each of the following combinations of alignment requirements and header sizes.

Assumptions:
1. Implicit free list
2. Block size = sizeof (header) + sizeof (payload) + sizeof (padding)

Alignment	Header Size	Maximum block size (bytes)
Single Word	1 byte	
Single Word	2 bytes	
Double Word	1 byte	
Double Word	2 bytes	