Problem ST-2 (3 parts) Pointers and Arrays

Assuming a 32-bit system with 32-bit memory interface and 32-bit addresses, answer the following questions. The following variables are allocated in memory beginning at address 5000.

Part A Complete the memory map below with the variable names at each word or byte in memory. Do not include the variable's value.

```
double A;
double B;
double *P = &A;
float  C[] = {3.14, 6.28};
char   S[] = "Help!";
float  *Q = &(C[1]);
```

5000	A	→	→	→
5004	A	→	→	→
5008	B	→	→	→
5012	B	→	→	→
5016	P	→	→	→
5020	C[0]	→	→	→
5024	C[1]	→	→	→
5028	S[0]	S[1]	S[2]	S[3]
5032	S[4]	S[5]	slack	slack
5036	Q	→	→	→
5040				

Part B Determine the numerical values for the following expressions.

P	5000	P++	5008	*(C+1)	6.28	&Q	5036
Q	5024	*(Q-1)	3.14	S[1]	'e'	&(S[3])	5031

Part C Write the MIPS code implementation of the dynamically allocated array access below in the smallest number of instructions. A pointer to the array (declared below) is stored in $3. Variables A and B reside in $4 and $5, respectively. Modify only $1 and $2 and the indexed memory location.

```
int      Array[17][8];     /* array declaration */
Array[A][B] = 25;          /* implement this */
```

Label	Instruction	Comment
	sll $1, $4, 3	# A*8
	add $1, $1, $5	# A*8 + B
	sll $1, $1, 2	# scale by 4
	add $1, $1, $3	# add base
	addi $2, $0, 25	# $2: 25
	sw $2, 0($1)	# store 25