In the following problem, you are given the task of reconstructing C code based on some declarations of C structures and unions, and the IA32 assembly code generated when compiling the C code.

Below are the data structure declarations. (Note that this is a single declaration which includes several data structures; they are shown horizontally rather than vertically simply so that they fit on one page.)

```
struct s1 {              struct s2 {              union u1 {
  char a[3];               struct s1 *d;            struct s1 *h;
  union u1 b;              char e;                  struct s2 *i;
  int c;                   int f[4];                char j;
};                        struct s2 *g;           };
                        };
```

You may find it helpful to diagram these data structures in the space below:

Problem 19. (12 points):

For each IA32 assembly code sequence below on the left, fill in the missing portion of corresponding C source line on the right.

```
A. proc1:                     int proc1(struct s2 *x)
      pushl %ebp              {
      movl %esp,%ebp              return x->_____ ;
      movl 8(%ebp),%eax        }
      movl 12(%eax),%eax
      movl %ebp,%esp
      popl %ebp
      ret

B. proc2:                     int proc2(struct s1 *x)
      pushl %ebp              {
      movl %esp,%ebp              return x->_____ ;
      movl 8(%ebp),%eax        }
      movl 4(%eax),%eax
      movl 20(%eax),%eax
      movl %ebp,%esp
      popl %ebp
      ret

C. proc3:                     char proc3(union u1 *x)
      pushl %ebp              {
      movl %esp,%ebp              return x->_____ ;
      movl 8(%ebp),%eax        }
      movl (%eax),%eax
      movsbl 4(%eax),%eax
      movl %ebp,%esp
      popl %ebp
      ret

D. proc4:                     char proc4(union u1 *x)
      pushl %ebp              {
      movl %esp,%ebp              return x->_____ ;
      movl 8(%ebp),%eax        }
      movl (%eax),%eax
      movl 24(%eax),%eax
      movl (%eax),%eax
      movsbl 1(%eax),%eax
      movl %ebp,%esp
      popl %ebp
      ret
```