CSC 209 Review 4 Solution

August 19, 2020

1. The answer is `a) *p` and `g) *&i`.

   Notes

   - **Address and Indirection Pointers**
     - If `x` is a variable, `&x` points to its memory address
     - * in `*p` is called **Indirection operator**
       - Allows variable to gain access to the object pointed by `p`
   - **Aliases**
     - Is the situation where the value in same memory location can be accessed using different variable names.

       Example 1:

       ```
       int i, p*;
       p = & i;
       printf("%d\n", *p); /* *p is an alias of i */
       ```

       Example 2:

       ```
       int i, p*;
       p = *&i /* *p is an alias of i */
       ```

2. The answers are `b) *p = &i;`, `f) p = q;`, and `i) *p = *q;`

   Correct Solution

   The answers are `e) p = *&q;`, `f) p = q;`, and `i) *p = *q;`

   `p = *&q;` is the same as `p = q`

Notes

- The `*` operator turns a *value* of type `pointer to T` into a *variable* of type `T`.
- The `&` operator turns a *variable* of type `T` into a *value* of type pointer to `T`.
- **Pointer Assignment**
  - The following is an example of correct pointer assignment

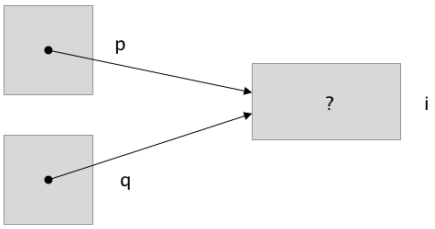
```
int i, j, *p. *q;
p = &i;
```

    * Means the memory address of `p` is pointing to memory address of `i`

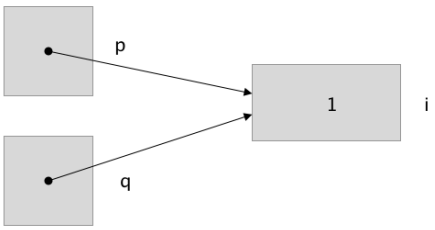
  - The following is another valid example of pointer assignment

```
int i, j, *p. *q;
p = &i;
q = p;
```

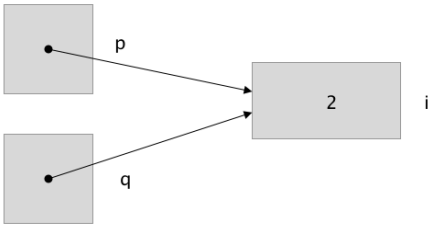
    * Means memory address of `q` is the memory address of `p` (which is the memory address of `i`)




```
*p = 1;
```



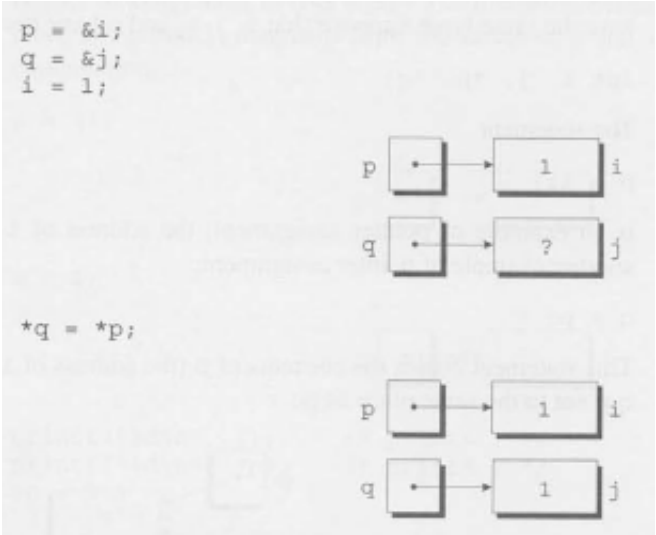

```
*p = 2;
```



– The following is not a pointer assignment

```
*q = *p
```

  * It copies the value that `p` points to



3.
```
1  void avg_sum(double a[], int n, double *avg, double *sum)
2  {
3      int i;
4
5      *sum = 0.0;
6      for (i = 0; i < n; i++)
7          *sum += a[i];
8      *avg = *sum / n;
9  }
```

Notes:

- **Pointer as Arguements:**
  – Construct protype using pointer variable as parameter so it can be passed by refernce

  Example

```
void decompose(double x, long *int_part, double *frac_part);

or

void decompose(double, long *, double *);
```

```
void decompose(double x, long *int_part, double *frac_part)
{
  *int_part = (long) x;
  *frac_part = x - *int_part;
}
```

– When using the prototype, pass variable to prototype by reference using & operator (points to variable's memory location)

```
decompose(3.14159, &i, &d);
```