```
#include <stdio.h>
void swap ( int* p, int* q ) {
      int  temp;
      temp = *p;
      *p = *q;
      *q = temp;
}

void main ( int argc, char* argv[] ) {
      int a = 101;
      int b = -2;
      int*  pa;
      int*  pb;
      int*   ptemp;

1     printf( "\nThis is the output from %s:\n\n", argv[0] );

      printf( "To begin, a is %d, b is %d\n", a, b );
      swap( &a, &b );
      printf( "After swap(&a, &b), a is %d, b is %d\n", a, b );

      pa = &a;
      pb = &b;

2     printf( "\nNow pa points to an object with value %d,"
2        "\nand pb points to an object with value %d\n", *pa, *pb );
      swap( pa, pb );
3     printf( "After swap(pa, pb), a is %d, b is %d\n", a, b );
      printf( "And pa points to an object with value %d,"
         "\nand pb points to an object with value %d\n", *pa, *pb );

      ptemp = pa;
      pa = pb;
      pb = ptemp;
4     printf( "\nAfter swaping pa and pb,\npa points to an object with value %d,"
         "\nand pb points to an object with value %d\n", *pa, *pb );
      printf( "But a is %d, b is %d\n", a, b );
}
```

```
This is the output from pointers-2:

a is 101, &a is effffcdc
pa is effffcdc, &pa is effffcd8
7 ppa is effffcd8, &ppa is effffcd4
8 All these are the same: a 101, *pa 101, **ppa 101
```

```
1       This is the output from pointers-1:

        To begin, a is 101, b is -2
        After swap(&a, &b), a is -2, b is 101

2       Now pa points to an object with value -2,
2       and pb points to an object with value 101
3       After swap(pa, pb), a is 101, b is -2
        And pa points to an object with value 101,
        and pb points to an object with value -2

4       After swaping pa and pb,
        pa points to an object with value -2,
        and pb points to an object with value 101
        But a is 101, b is -2
```

```
        #include <stdio.h>
        void main(int argc, char* argv[]) {
                int a = 101;        /* a is an int */
5               int*  pa;           /* pa is a pointer to an int */
6               int*  *ppa;         /* ppa is a pointer to a pointer to an int */

                printf( "\nThis is the output from %s:\n\n", argv[0] );

                printf( "a is %d, &a is %x\n", a, (int) &a );
7               pa = &a;
                printf( "pa is %x, &pa is %x\n", (int) pa, (int) &pa );
8               ppa = &pa;
                printf( "ppa is %x, &ppa is %x\n", (int) ppa, (int) &ppa );

                /* At this point we have created a pointer chain:
                        ppa -> pa -> a
                * /

                printf( "All these are the same: a %d, *pa %d, **ppa %d\n",
                a, *pa, **ppa );
        }
```