

## reality.c

```
#include <stdio.h>
#include <stdlib.h>

void reality_1_example_1();
void reality_1_example_2();
void reality_3();
double fun();

typedef struct {
    int a[2];
    double d;
} struct_t;

int main(int argc, char **argv) {
    int n;    /* used to loop for reality_3() */

    reality_1_example_1();
    reality_1_example_2();

    if (argc==1) n = 5; /* default 5 iter */
    else n = atoi(argv[1]);
    reality_3(n);

    return 0;
}

void reality_1_example_1(){
    float f=50000, total_f;
    int i=40000, total_i;

    /* fill here */
    total_f = f * f;
    printf("reality_1_example_1_float: f=%f\n", f);
    if(total_f >= 0) {
        printf("f*f=%f >= 0\n\n", total_f);
    } else { printf("f*f=%f < 0\n\n", f*f); }

    total_i = i * i;
    printf("reality_1_example_1_int: f=%d\n", i);
    if(total_i >= 0) {
        printf("i*i=%d >= 0\n\n", total_i);
    } else { printf("i*i=%d < 0\n\n", i*i); }

    i=50000;
```

```

/* fill here */
total_i = i * i;
printf("reality_1_example_1_int: f=%d\n", i);
if(total_i >= 0) {
    printf("i*i=%d >= 0\n\n", total_i);
} else { printf("i*i=%d < 0\n\n", i*i); }
}

void reality_1_example_2(){
    float fx=1e20,fy=-1e20,fz=3.14;
    unsigned int uix=12,uiy=34,uiz=56;
    int six=12,siy=34,siz=56;

    /* fill here */
    printf("reality_1_example_2_unsigned: uix=%d uiy=%d uiz=%d\n", uix, uiy, uiz);
    unsigned int sum1_u = (uix+uiy)+uiz, sum2_u = uix+(uiy+uiz);
    if(sum1_u == sum2_u) {
        printf("((uix+uiy)+uiz)=%d == (uix+(uiy+uiz))=%d\n\n", sum1_u, sum2_u);
    } else { printf("((uix+uiy)+uiz)=%d != (uix+(uiy+uiz))=%d\n\n", sum1_u, sum2_u); }

    printf("reality_1_example_2_signed: six=%d siy=%d siz=%d\n", six, siy, siz);
    int sum1_i = (six+siy)+siz, sum2_i = six+(siy+siz);
    if(sum1_i == sum2_i) {
        printf("((six+siy)+siz)=%d == (six+(siy+siz))=%d\n\n", sum1_i, sum2_i);
    } else { printf("((six+siy)+siz)=%d != (six+(siy+siz))=%d\n\n", sum1_i, sum2_i); }

    printf("reality_1_example_2_float: fx=%1.6e fy=%1.6e fz=%1.6f\n", fx, fy, fz);
    float sum1_f = (fx+fy)+fz, sum2_f = fx + (fy+fz);
    if(sum1_f == sum2_f) {
        printf("((fx+fy)+fz)=%1.6e == (fx+(fy+fz))=%1.6e\n\n", sum1_f, sum2_f);
    } else { printf("((fx+fy)+fz)=%1.6e != (fx+(fy+fz))=%1.6e\n\n", sum1_f, sum2_f); }

}

void reality_3(int n) {
    double d;
    int i;

    /* fill here */
    printf("reality_3: n=%d iterations\n", n);
    for(i = 0; i < n; i++) d = fun(i);

}

double fun(int i){

```

```

volatile struct _t s;

s.d = 3.14;
s.a[i] = 1073741824;
printf("fun(%d) -> %f\n",i,s.d);

return s.d;
}

/* End of file */

```

```

❌ adirathodd@adi HW1 % ./reality 22
reality_1_example_1_float: f=50000.000000
f*f=2500000000.000000 >= 0

reality_1_example_1_int: f=40000
i*i=1600000000 >= 0

reality_1_example_1_int: f=50000
i*i=-1794967296 < 0

reality_1_example_2_unsigned: uix=12 uiy=34 uiz=56
((uix+uiy)+uiz)=102 == (uix+(uiy+uiz))=102

reality_1_example_2_signed: six=12 siy=34 siz=56
((six+siy)+siz)=102 == (six+(siy+siz))=102

reality_1_example_2_float: fx=1.000000e+20 fy=-1.000000e+20 fz=3.140000
((fx+fy)+fz)=3.140000e+00 != (fx+(fy+fz))=0.000000e+00

reality_3: n=22 iterations
fun(0) -> 3.140000
fun(1) -> 3.140000
fun(2) -> 3.140000
fun(3) -> 2.000001
fun(4) -> 3.140000
fun(5) -> 3.140000
fun(6) -> 3.140000
fun(7) -> 3.140000
fun(8) -> 3.140000
fun(9) -> 3.140000
fun(10) -> 3.140000
fun(11) -> 3.140000
fun(12) -> 3.140000
fun(13) -> 3.140000
fun(14) -> 3.140000
fun(15) -> 3.140000
fun(16) -> 3.140000
fun(17) -> 3.140000
fun(18) -> 3.140000
fun(19) -> 3.140000
zsh: segmentation fault ./reality 22

```

## reality4.c

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/time.h>
#include <stdint.h>

#define NNN 2048

void copyij();
void copyji();
void init_mat();
int64_t time_diff();

int src[NNN][NNN], dst[NNN][NNN];

int main(int argc, char **argv) {

    int i,j,n;

    long int del_sec, del_msec;
    struct timeval tv_s, tv_e;

    init_mat();
    gettimeofday(&tv_s, NULL);
    copyij();
    gettimeofday(&tv_e, NULL);

    /* fill here to compute elapsed time */
    del_sec = tv_e.tv_sec - tv_s.tv_sec, del_msec = tv_e.tv_usec - tv_s.tv_usec;
    printf("copyji(): dim=%d: elapsed=%ld.%03ld secs\n", NNN, del_sec, del_msec/1000);

    init_mat();
    gettimeofday(&tv_s, NULL);
    copyji();
    gettimeofday(&tv_e, NULL);

    /* fill here to compute elapsed time */
    del_sec = tv_e.tv_sec - tv_s.tv_sec, del_msec = tv_e.tv_usec - tv_s.tv_usec;
    printf("copyji(): dim=%d: elapsed=%ld.%03ld secs\n", NNN, del_sec, del_msec/1000);

    return 0;
}

void copyij(){
    int i,j;
```

```

/* fill here */
for(i = 0; i < NNN; i++)
    for(j = 0; j < NNN; j++)
        dst[i][j] = src[i][j];
}

void copyji(){
    int i,j;

    /* fill here */
    for (j = 0; j < NNN; j++)
        for (i = 0; i < NNN; i++)
            dst[i][j] = src[i][j];
}

void init_mat(){
    int i,j;

    for (i=0;i<NNN;i++)
        for (j=0;j<NNN;j++) src[i][j] = dst[i][j] = 1;
}

```

```

● adirathodd@adi HW1 % ./reality4
  copyji(): dim=2048: elapsed=0.006 secs
  copyji(): dim=2048: elapsed=0.044 secs
○ adirathodd@adi HW1 % █

```