Program to illustrate the use of void pointers in C/C++

Notes:
* Based on the use of void pointers in gsl library, using the discussion in "Practical C++" and online sources.
* As a convention (advocated in "Practical C++"), we'll append "ptr" to all pointers.
* Each of the sample functions has arguments like those in the GSL integration routines. We illustrate in each two ways to access the passed values (by setting them equal to local variables or pointers).
* If my_struct is a structure containing doubles a,b,c, then we can set a = b + 1. using:
my_struct.a = my_struct.b + 1
If my_struct_ptr is a pointer to a structure containing doubles a,b,c, then we can set a = b + 1 using:
my_struct_ptr->a = my_struct_ptr->b + 1.
* C/C++ uses for void for two different purposes:
  * if a function is declared as void, it means that the function doesn’t return anything
  * if a pointer is declared as void, it means that the pointer can point to ANY type of thing (int, double, structure, etc.). This is the usage in GSL functions.
* When we want to refer to the thing pointed to by the void pointer, we have to "cast" it; that is, we have to specify the type. E.g., if we declare params_ptr as a void pointer:
  void *params_ptr
we can dereference a double using
(double *) params_ptr
(See the examples below!)
* The output of the program should be:

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passed_int and *passed_ptr should have the same value: 5
so . . . passed_int = 5 and *passed_ptr = 5
passed_double and *passed_ptr should have the same value: 13.3
so . . . passed_double = 13.3 and *passed_ptr = 13.3

Expected: a = 1.4, b = 2.2, c = 3.3, num = 4
Passed: a = 1.1, b = 2.2, c = 3.3, num = 4
Expected: a = -1.4, b = 20.1, c = 0.9, num = 2
Passed: a = -1.4, b = 20.1, c = 0.9, num = 2

#include <iostream>
#include <iomanip>
using namespace std;

// function prototypes
double f_int (double x, void *params_ptr);
double f_double (double x, void *params_ptr);
double f_struct (double x, void *params_ptr);

typedef struct
typedef >

//************************** f_int ***************************
int f_int (void)
{
  void *params_ptr;
  int my_int = 5;
  double x = 2.1;
  double my_double = 13.3;
  double *passed_ptr = &my_int;
  double *passed_int = &my_int;
  double *passed_double = &my_double;
  int num = 2;
  cout << endl << "Program to illustrate the use of void pointers in C/C++";
  cout << endl;
  cout << "The returned result is " << returned_result << endl;
  cout << endl << "Passed: a = -1.4, b = 20.1, c = 0.9, num = 2";
  cout << endl;
  cout << "Expected: a = -1.4, b = 20.1, c = 0.9, num = 2";
  cout << endl;</b>
int passed_int = *(int *) params_ptr;
passed_ptr = (int *) params_ptr;
cout << "so...passed_int=" << passed_int
   << "and" << passed_ptr << " passed_ptr" << *passed_ptr << endl;
return (x * (double) passed_int); // sample return value
}

double f_double (double x, void *params_ptr)
{
    double *passed_ptr;
    double passed_double = *(double *) params_ptr;
passed_ptr = (double *) params_ptr;
cout << "so...passed_double=" << passed_double
   << " and" << passed_ptr << " passed_ptr" << *passed_ptr << endl;
return (x * passed_double); // sample return value
}

doctor f_osu_parameters (double x, void *params_ptr)
{
    osu_parameters *passed_ptr;
passed_ptr = (osu_parameters *) params_ptr;
    double passed_double_1 = *((osu_parameters *) params_ptr)->a;
double passed_double_2 = passed_ptr->b;
double passed_double_3 = *((osu_parameters *) params_ptr)->c;
    int passed_int = *((osu_parameters *) params_ptr)->num;
cout << "Passed:  a=" << passed_double_1
   << "b=" << passed_double_2
   << "c=" << passed_double_3 << ",num=" << passed_int << endl;
return (x * passed_double_1); // sample return value
}