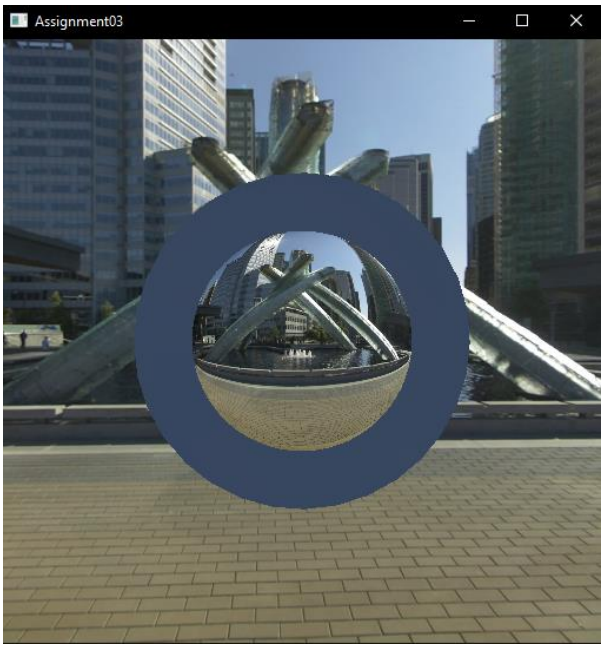
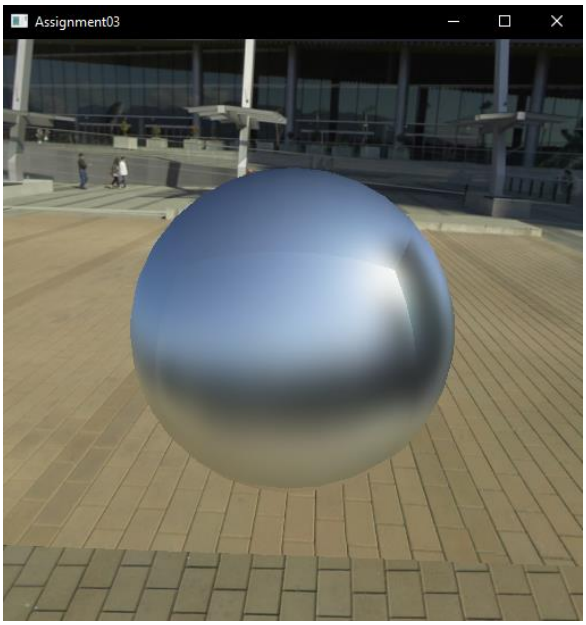
Part One: (Reflection & Refraction)



To obtain the result showcased in the above image a using a value of 1.5 for the glass' index of refraction.

To run part 1 (Reflection & Refraction) of this assignment, run the program with the command line arguments *a a*. The vertex shader will remain the same for all parts, just the fragment shader will change

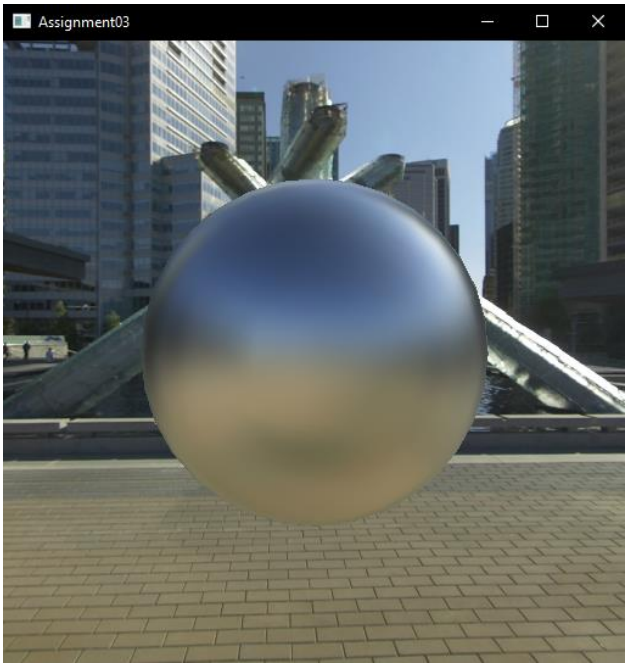
Part Two (Diffuse Reflection part One)



In order to obtain this diffuse reflection, the Vancouver Convention Center images were resized to a size of 512x512 pixles and had a gaussian blur applied to them. These images were then used to create a new

cube and environment map. The code for this program can be found in example12b.fs. To run this part of the assignment, run the program with the command line arguments *a b*.

Part Three (Diffuse Reflection 2)



For this final part of the assignment, the provided shader for random numbers was copied into example12c.fs. Positive sampling directions were generated. To get a reasonable image 500 samples where used along with the weighted sum. The code for this part can be found in example12c.fs. To run this part of the assignment run the program with the command line arguments *a c*.

How to run my program.

I have used Visual Studio Code to do my assignment instead of visual studios, making my build process slightly different. The following shows exactly how to build my program

1- Change directory of my assignment (cd Assignment03/bin)
2- Run the command `make` this will run the necessary commands for compilation and linking
3- Run the program using the command ./Assignment03.exe [vs] [fs]

The following 3 commands show how to run the 3 parts of the assignment

Part 1: ./Assignment03.exe a a

Part 2: ./Assignment03.exe a b

Part 3: ./Assignment03.exe a c

The following screenshot shows the entire workflow for building and running the program.

```
PS C:\Users\faree\Documents\School\ThirdYear\CSCI3090U\Assignments> cd .\Assignment03\bin\
PS C:\Users\faree\Documents\School\ThirdYear\CSCI3090U\Assignments\Assignment03\bin> make
g++ -I../include -c ../src/*.cpp ../src/*.cc
../src/texture.cpp: In function 'Cube* loadCube(char*)':
../src/texture.cpp:52:24: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
   52 |  char *extensions[] = {"posx.jpg", "negx.jpg", "posz.jpg", "negz.jpg", "posy.jpg", "negy.jpg" };
      |                        ^~~~~~~~~~
../src/texture.cpp:52:36: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
   52 |  char *extensions[] = {"posx.jpg", "negx.jpg", "posz.jpg", "negz.jpg", "posy.jpg", "negy.jpg" };
      |                                    ^~~~~~~~~~
../src/texture.cpp:52:48: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
   52 |  char *extensions[] = {"posx.jpg", "negx.jpg", "posz.jpg", "negz.jpg", "posy.jpg", "negy.jpg" };
      |                                                ^~~~~~~~~~
../src/texture.cpp:52:60: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
   52 |  char *extensions[] = {"posx.jpg", "negx.jpg", "posz.jpg", "negz.jpg", "posy.jpg", "negy.jpg" };
      |                                                            ^~~~~~~~~~
../src/texture.cpp:52:72: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
   52 |  char *extensions[] = {"posx.jpg", "negx.jpg", "posz.jpg", "negz.jpg", "posy.jpg", "negy.jpg" };
      |                                                                        ^~~~~~~~~~
../src/texture.cpp:52:84: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
   52 |  char *extensions[] = {"posx.jpg", "negx.jpg", "posz.jpg", "negz.jpg", "posy.jpg", "negy.jpg" };
      |                                                                                    ^~~~~~~~~~
../src/viewer.cpp: In function 'void init()':
../src/viewer.cpp:238:21: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
  238 |  texture = loadCube("../VancouverConventionCentre");
      |                     ^~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
../src/viewer.cpp:257:23: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
  257 |   texture2 = loadCube("../VancouverConventionCentreBlurred");
      |                       ^~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
g++ *.o -o Assignment03 -L../lib -lglfw3dll -lopengl32 -lgdi32 -lglew32 -lglu32 -lm -lfreeimage
```

```
PS C:\Users\faree\Documents\School\ThirdYear\CSCI3090U\Assignments\Assignment03\bin> .\Assignment03.exe a a
```