

Computer Science 102 Lab 3

In this lab you will begin the implementation of the *plane.c* module.

Components that are provided for you include: *main.c*, *ray.h*, *rayfuns.h*, *rayhdrs.h*, and a *makefile*. You must provide your own *vector.h* *camera.c* (the *cam_getdir*) function and will build *plane.c*.

A makefile for the multi-module program:

```
a.out: main.o plane.o vector.h ray.h rayfuns.h rayhdrs.h
    gcc -Wall -g *.o -lm
```

```
.c.o: $<
    -gcc -c -Wall -c -g $< 2> $(@:.o=.err)
    cat $*.err
```

The plane hits function

```
double plane_hits(
vec_t    *base,      /* ray base (the viewpoint) */
vec_t    *dir,      /* ray direction unit vector */
object_t *obj)      /* the plane object          */
```

This function must:

Determine if the ray hits the plane in negative z-space

If so, it must

1. store the location of the hit point in the *object_t* struct and
2. store a unit normal in the *object_t* structure
3. return the distance from the viewpoint to the hit point

If not, it must

1. return(-1);

Creating compressed *tar* archives

To save disk space and to facilitate transferring archives by e-mail it is common to compress *tar* archives. In the Linux version of *tar* the use of the *z* flag will cause *tar* to automatically perform compression when an archive is created and decompression when files are extracted.

```
tar czvf ../plane.tar.gz
tar tzvf ../plane.tar.gz
tar xzvf ../plane.tar.gz
```

Other versions of *tar* (such as SUN's) don't support the *z* flag. In these you must explicitly invoke the *gzip* and *gunzip* compression and decompression tools. To create a compressed *tar* archive:

```
tar cvf - * | gzip -c > ../plane.tar.gz
```

In the above command the *-* following the *cvf* tells *tar* to write the output archive to the standard output. The *|* symbol connects the standard output of *tar* to the standard input of *gzip* and the *-c* flag tells *gzip* read from the standard input. Note that *-* must precede *c* in the *gzip* but that *-* may not precede *cvf* in the *tar* command. Unix is wonderfully inconsistent in this way.

To uncompress and *untar*

```
gunzip -c ../plane.tar.gz | tar xvf -
```

use care here because *tar* will *overwrite any existing files* with the same names as files in the archive with *no warning*.

In this lab you will submit a compressed *tar* file named *plane.tar.gz* containing all the components needed to build your program.

```
sendlab.102.labsection# lab# plane.tar.gz
```

Since this is lab3 and if you are in section 1 the command you should use is (remember to *cd ..* because that is where you put your tarfile!)

```
sendlab.102.1 3 plane.tar.gz
```