

DSP Lab Exercise 4

Major Code Changes

1. Defined 16-bit int limit

```
max_val_16bit = 32767
min_val_16bit = -32768
```

With a very large gain, the computed sample value can exceed the valid range of 16bit signed integers (−32768 to +32767)

2. Added a clipping check before writing in

```
output_value = gain * y0

if output_value > max_val_16bit:
    clipped_value = max_val_16bit
elif output_value < min_val_16bit:
    clipped_value = min_val_16bit
else:
    clipped_value = int(output_value)

output_string = struct.pack('h', clipped_value)
stream.write(output_string)
```

What effect does this have on the sound produced by the program?

The sound now has **a distortion**, buzzy or harsh timbre, peaks are almost flattened. Seems fidelity is sacrificed somehow, sounds lo-fi.