320 Final

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Start Time: 21:45

Question 1

Included on notebook paper

Question 2

Included on notebook paper

Question 3

Parts a and b are included on notebook paper

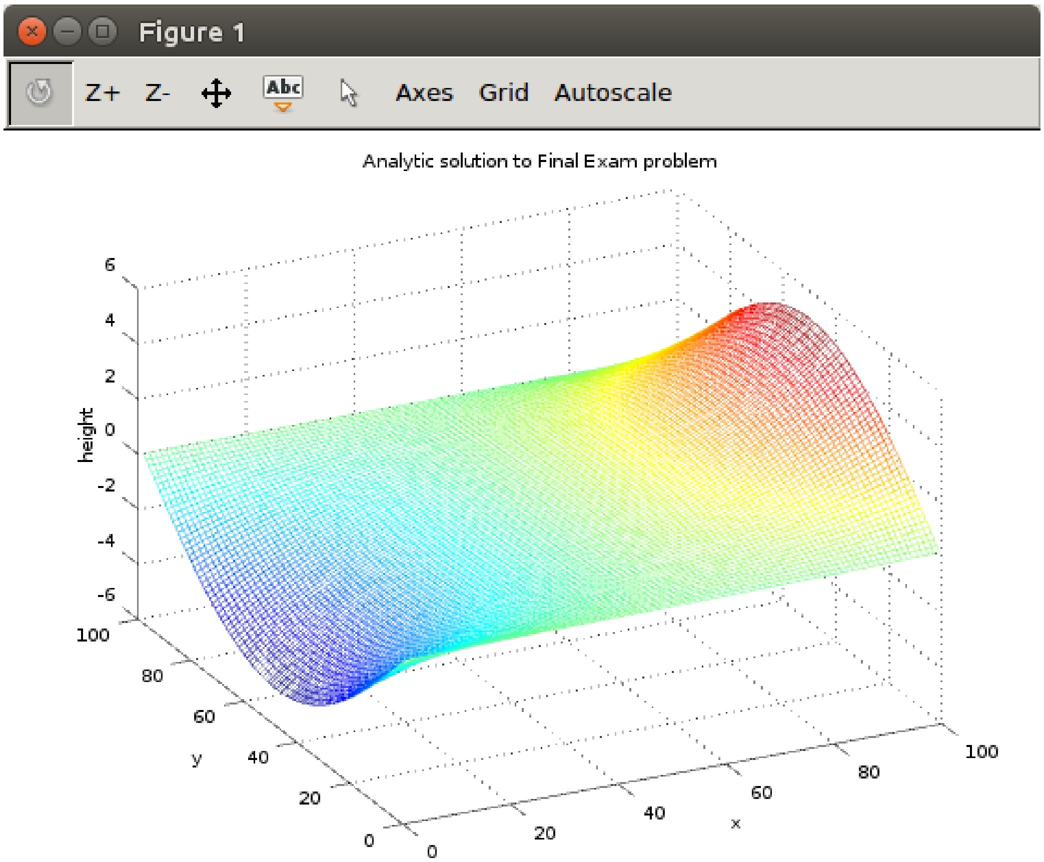
part c

Wrote a quick algorithm in the command line to make the output array of my solution

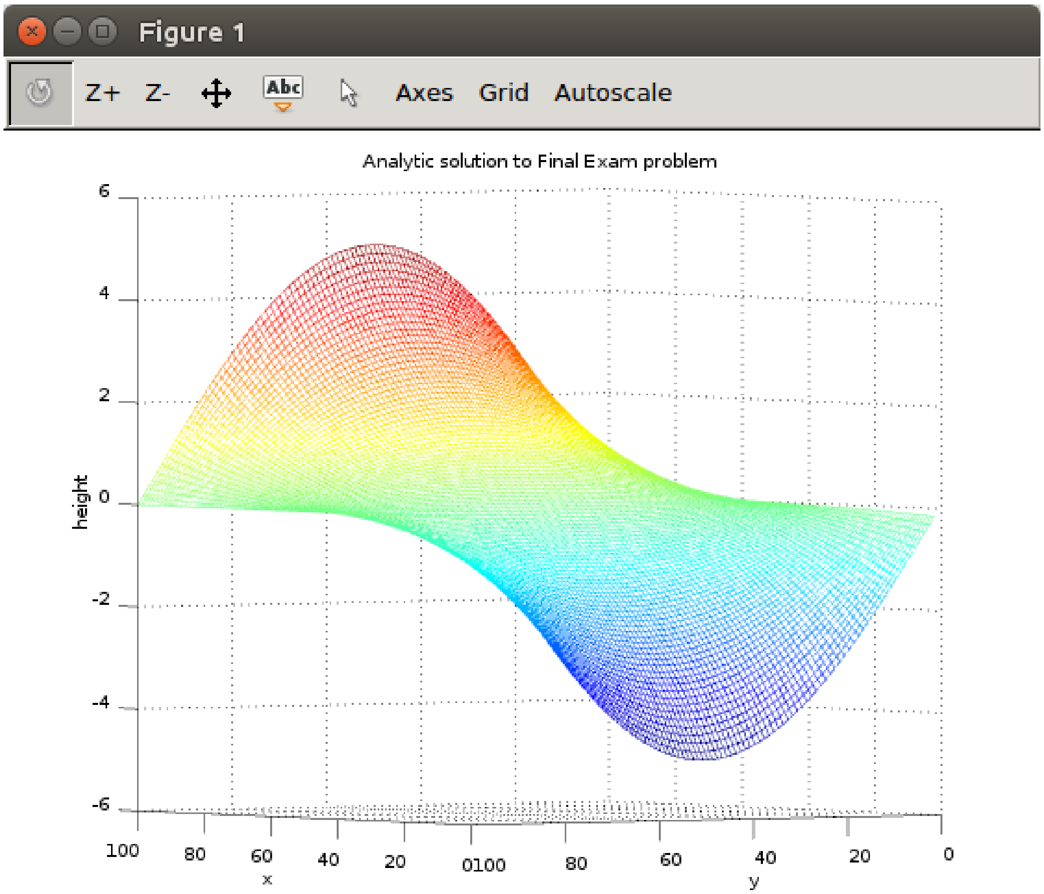
```
z =

@(x, y, h, l) (((h + h * e ^ (-pi)) / (e ^ (pi) - e ^ (-pi)))
* e ^ (pi / l * y) +((h + h * e^ (pi)) / (e ^ (-pi) - e ^ (pi)))
* e ^ (-pi / l * y)) .* sin (pi * x / l)

>> output = ones(100,100);
>> for x = 1:100
for y = 1:100
output(x,y) = z(x,y,5,100);
end
end
>> mesh(output)
```



Surprisingly it gave me a really nice answer on my first try! This has never happened before! Let me rotate it for a better angle and then explain



You can see on the two edges where $z(x, y = 0) = -h\sin(\pi x/l)$ and $z(x, y = l) = h\sin(\pi x/l)$, the boundary conditions are accurately preserved. In this scenario I randomly chose and h of 5 which you can see is the amplitude of the sine waves defining the boarder. As should be expected through LaPlance's equation there are no local maxima or minima. Additionally the boarders where $z(x =, y) = 0$ and $z(x = l, y) = 0$ are preserved. I am very happy with the outcome of my solution.

1 Question 5

My favorite skill learned was the Fourier Transform because they were fun both analytically and computationally! (I don't understand diffy qs analytically very well) I think it is very cool to be able to do frequency analysis so easily from data that otherwise seems random. I feel like Fourier transforms have awakened an entirely new perspective in my life! When I think about cool physics phenomena now, I add 'what might a Fourier Transform of this look like?' It really helps my understanding!