

Group Members Names

1. For each of the following set ups, find the value of  $R$  so that  $x = R$  would divide the area of the region under the graph of  $f$  in the first quadrant into equal areas.

(a)  $f_1(x) = 10 - x^2$

(b)  $f_2(x) = 10 - 2x^2$

(c)  $f_3(x) = 10 - 3x^2$

(d)  $f_4(x) = 10 - 4x^2$

2. For each of the four functions given below, (each of which is only defined on the interval  $[-1, 1]$ ) compute the surface area and volume that results when the function is revolved about the  $x$ -axis. What patterns do you see? Now do it again, but around the  $y$ -axis. Again, what patterns do you see?

•  $f_1(x) = x^2 - 1$

•  $f_2(x) = x^4 - 1$

•  $f_3(x) = x^6 - 1$

•  $f_4(x) = x^8 - 1$

3. For each of the four functions given below, compute the surface area and volume that results when the function is revolved about the  $x$ -axis. What patterns do you see? Now do it again, but around the  $y$ -axis. Again, what patterns do you see?

•  $y^2 + x^2 = 4^2$

•  $y^4 + x^4 = 4^4$

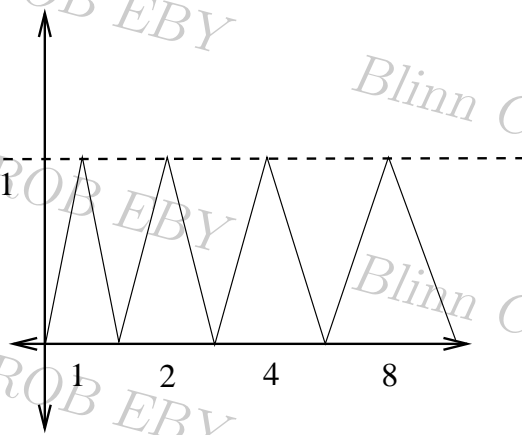
•  $y^6 + x^6 = 4^6$

•  $y^8 + x^8 = 4^8$

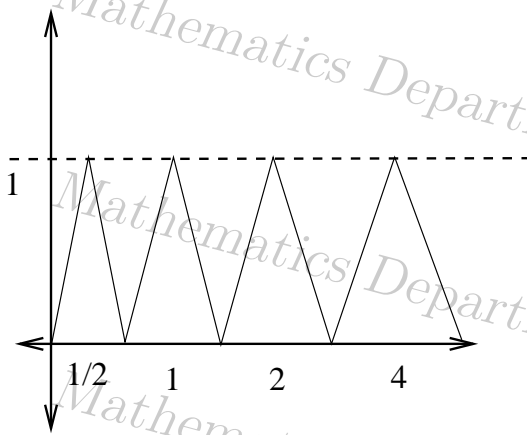
4. For each of the functions given below, find the volume and surface area when the graph is revolved about the  $y$ -axis. Comment on the patterns you observe. The functions are only defined on  $[0, 1]$ . (It might help to graph each function)

- $f_1(x) = -x + 1 \quad 0 \leq x \leq 1$
- $f_2(x) = (-10/9)x + 1 \quad 0 \leq x \leq 9/10, \quad f_2(x) = 0 \quad 9/10 \leq x \leq 1$
- $f_3(x) = (-9/8)x + 1 \quad 0 \leq x \leq 8/9, \quad f_3(x) = 0 \quad 8/9 \leq x \leq 1$
- $f_4(x) = (-8/7)x + 1 \quad 0 \leq x \leq 7/8, \quad f_4(x) = 0 \quad 7/8 \leq x \leq 1$
- $f_5(x) = (-7/6)x + 1 \quad 0 \leq x \leq 6/7, \quad f_5(x) = 0 \quad 6/7 \leq x \leq 1$

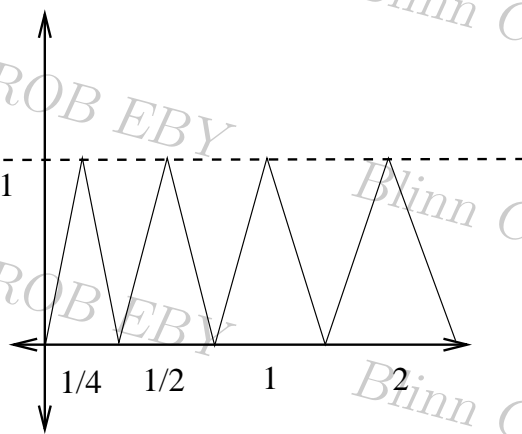
5. For each graph below, compute the surface area and volume that results when the graph is revolved about the  $x$ -axis. What patterns do you notice? If you want, I give the function that generates the first graph below.



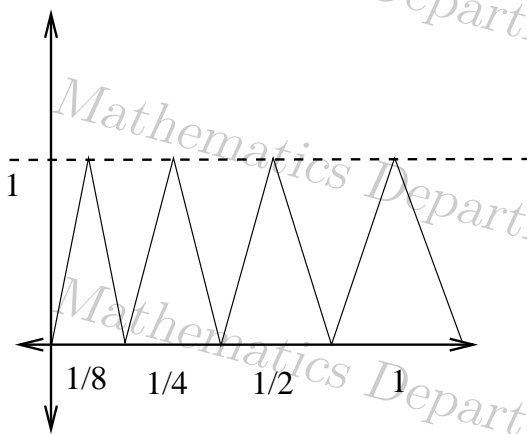
F1



F2



F3



F4