Memo II Calculus 2

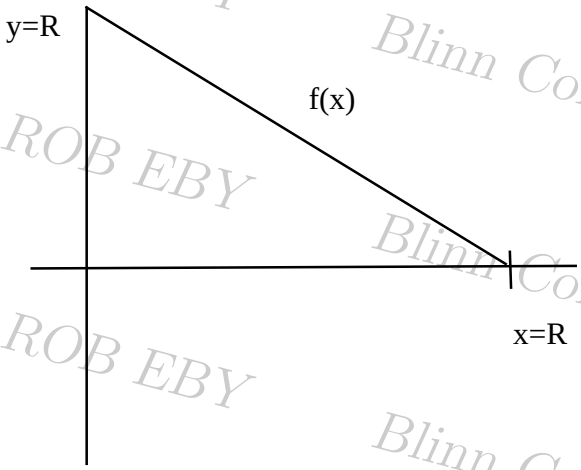
1. Suppose you know $f(0) = R > 0, 0 \leq f'(a) \leq 2$ on the interval $[0, b]$. What is the maximum and minimum value obtained when you revolve $f$ about the horizontal axis? Perform the Calculus and explain the geometry involved. Each line of mathematics here counts as 10 words, there must be at least 4 lines in the computations.

2. Suppose you know $f(0) = R > 0, -2 \leq f'(a) \leq 0$ on the interval $[0, b]$. What is the maximum and minimum value obtained when you revolve $f$ about the horizontal axis? Perform the Calculus and explain the geometry involved. Each line of mathematics here counts as 10 words, there must be at least 4 lines in the computations.

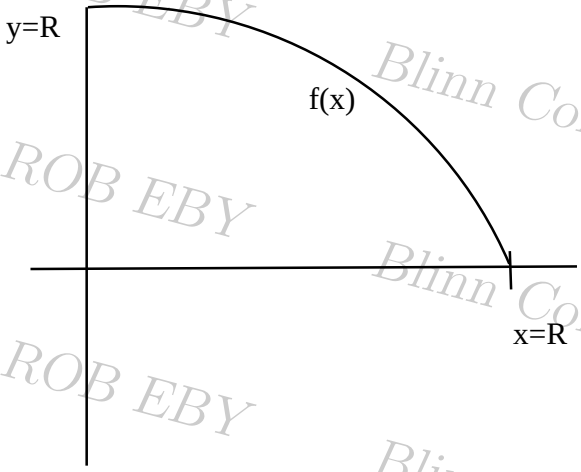
3. Suppose you know $f(0) = R > 0, -1 \leq f'(a) \leq 1$ on the interval $[0, b]$. What is the maximum and minimum value obtained when you revolve $f$ about the horizontal axis? Perform the Calculus and explain the geometry involved. Each line of mathematics here counts as 10 words, there must be at least 4 lines in the computations.

4. Given $f(x) = R$ from $a = 3, b = 6$ find the volume as you rotate it about x=1. What two horizontal line y-values give equal volume? Explain two ways, with Calculus and Geometry

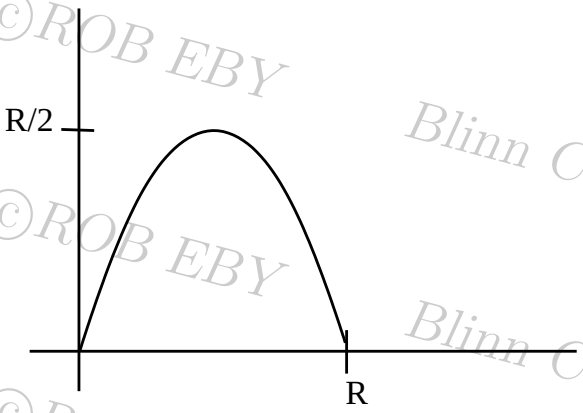
5. (r3) Revolve the following graph from $x = -R$ to $x = R$ around the x=axis. What happens to the volume if the function is (1) odd? (2) even?




6. (r4) Revolve the following graph from $x = -R$ to $x = R$ around the x=axis. (Circular arc) What happens to the volume if the function is (1) odd? (2) even?

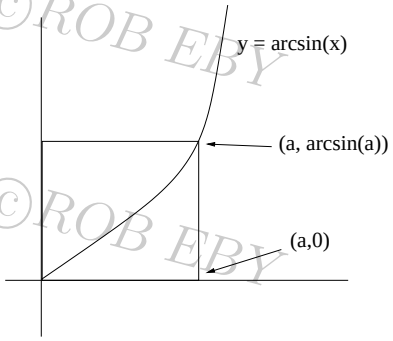


7. (r5) Revolve the following graph from $x = -R$ to $x = R$ around the x=axis. (graph of $f(x) = x(x - R)$ in Q1, but only the Q1 part!) What happens to the volume if the function is (1) odd? (2) even?




8. Using the picture, give a geometric argument and also a calculus arguement as to why the following is correct for $0 \le a \le 1$:

$$\int_0^r \arcsin x \, dx = a \arcsin a - \int_0^{\arcsin a} \sin y \, dy$$




9. Explain why the *circle of radius two, centered at the orgin* and *the circle of radius two centered at (0,2)* are easy in polar, but *the circle of radius two centered at (0,1)* is not. Show the derivation of the polar form from the rectangular form. Each line of mathematics here counts as 10 words, there must be at least 3 lines.

10. Explain why the *circle of radius two, centered at the orgin* and *the circle of radius two centered at (2,0)* are easy in polar, but *the circle of radius two centered at (1,0)* is not. Show the derivation of the polar form from the rectangular form. Each line of mathematics here counts as 10 words, there must be at least 3 lines.