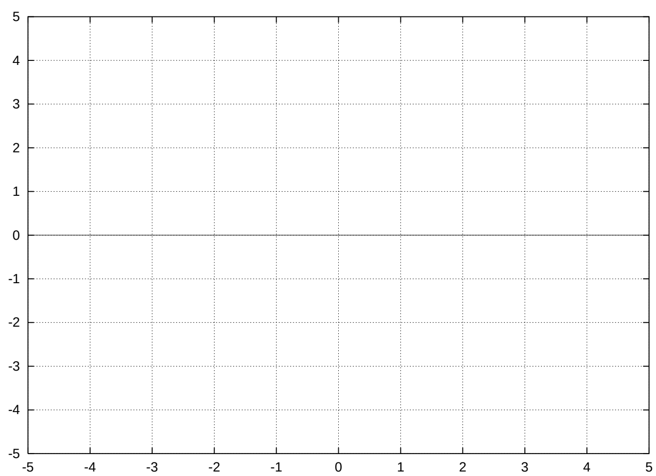
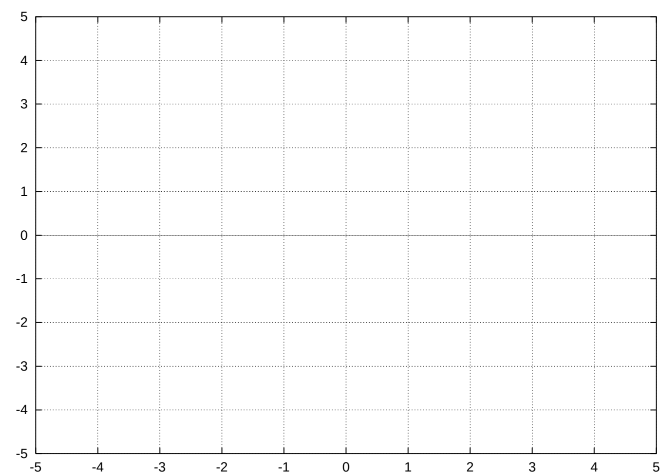
Accumulation Functions as Antiderivatives
Class 7: Wednesday February 5

In general, we define the accumulation function $A(\mathcal{X})$ for the function $f(x)$ as $A(\mathcal{X}) = \int_0^{\mathcal{X}} f(x)dx$

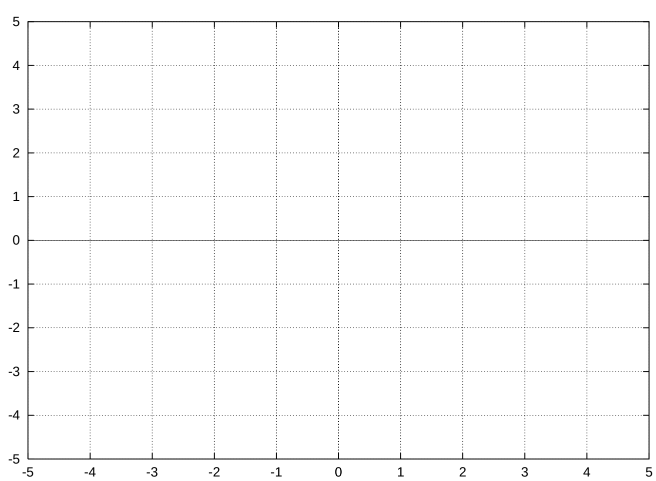
1. As $\mathcal{X} > 0$ gets bigger, what does the graph of $A(\mathcal{X})$, the accumulation function for the contstant function $f(x) = 1$ from 0 to $\mathcal{X}$ look like? (Describe the shape)

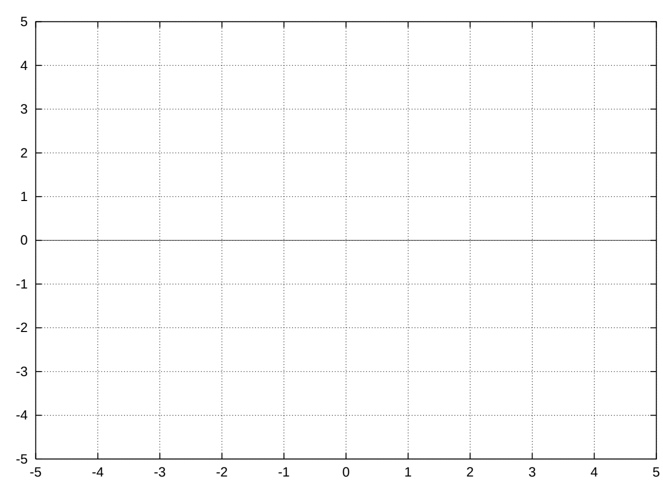




HINT: Compute $A(0)$**,** $A(1)$**,** $A(-1)$**,** $A(2)$**,** $A(-2)$ **et cetera...**

2. As $\mathcal{X} > 0$ gets bigger, what does the graph of $B(\mathcal{X}) = \int_0^{\mathcal{X}} g(x)dx$, the accumulation function for the linear function $g(x) = x$ from 0 to $\mathcal{X}$ look like? (Describe the shape)





HINT: Compute $B(0)$**,** $B(1)$**,** $B(-1)$**,** $B(2)$**,** $B(-2)$ **et cetera...**

3. Do you see any link between the SLOPE of the graph of the accumulation function $A(\mathcal{X})$ and the VALUE of the function $f(x)$? Can you use this information to write down an expression for $A(\mathcal{X})$ in terms of $\mathcal{X}$?

4. Do you see any link between the SLOPE of the graph of the accumulation function $B(\mathcal{X})$ and the VALUE of the function $g(x)$? Can you use this information to write down an expression for $A(\mathcal{X})$ in terms of $\mathcal{X}$?

5. Therefore, what is the meaning of the term **anti-derivative**?

6. Consider the difference between $A(1)$ and $A(0)$. $A(1) - A(0) =$____________.

7. The value of $A(1) - A(0)$ can also be interpreted as an area under the graph of $f(x)$. Write down a definite integral representing this area.

8. Consider the difference between $B(2)$ and $B(0)$. Can you write down and evaluate a definite integral which is exactly equal to $B(2) - B(0)$?

9. Therefore, if you know that $F(\mathcal{X}) = \displaystyle\int_c^{\mathcal{X}} f(x)dx$ is an accumulation function for $f(x)$ write down an expression which relates the value of $\int_a^b f(x)dx$ to particular values of $F(x)$