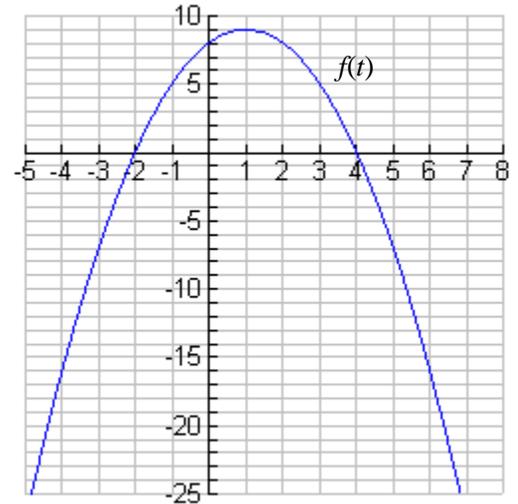


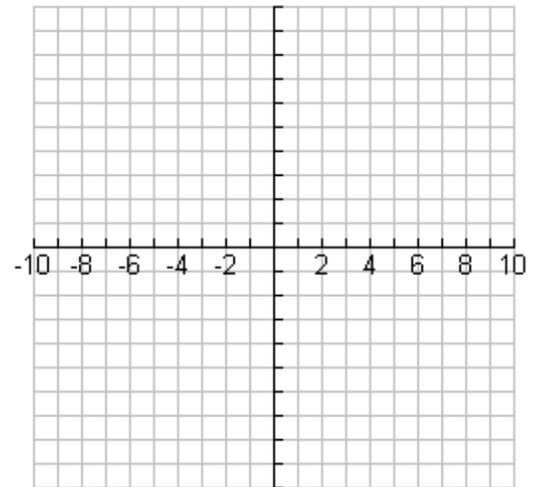


Calculus, Investigation 5.4 #3

Consider the function $h(x) = \int_x^{x+2} f(t)dt$ where $f(t) = (4-t)(t+2)$ as shown in the graph to the right. Use your calculator and define $f(t) = (4-t)(t+2)$ for this problem.



1. Explain what $h(2)$ is finding.
2. Without calculating, explain why you think $h(2)$ will be positive or negative.
3. Calculate $h(2)$. (Use your calculator to do so.)
4. Calculate $h(4)$.
5. Calculate $h(6)$.
6. Without calculating, explain why you think $h(8)$ will be positive or negative.
7. When do you think $h(x)$ will be 0? Explain.
8. Sketch a graph of $h(x)$ from your calculated values. Add more values as you see fit.
9. What kind of function do you think $h(x)$ is from looking at the graph of $h(x)$?
10. Looking at the graph of $h(x)$, where is its extrema? Explain how the graph of $f(t)$ supports this.



11. Look closely at the graph of $f(t)$. Where is the maximum of $f(t)$? How does this relate to the graph of $h(x)$? How about the zeroes of $f(t)$, how do they relate to $h(x)$?

12. Describe in words how you see the functions $f(t)$ and $h(x)$ relate to each other.

13. Consider the function $g(x) = \int_x^{x-2} f(t)dt$ for the same function $f(t)$ graphed above. How will the graphs of $g(x)$ and $h(x)$ compare? Why?

14. What about $p(x) = \int_x^{x+10} f(t)dt$? How does $p(x)$ compare to $g(x)$ and $h(x)$?

15. Describe in words how you see the relationship between the functions $f(t)$ and $k(x) = \int_x^{x+a} f(t)dt$ where a is some constant.