Homework 1

Math 252

Due April 7th at 11:59 PM

Textbook Exercises

1.1: 1, 3, 5, 13, 23, 37

1.2: 65, 73, 77, 81, 89

Exercise 1: Let n be a positive integer. Evaluate $\sum_{i=0}^{n}(i^2+i+1)$.

Exercise 2: Let f be the function defined by

$$f(x) = \begin{cases} -1, & 0 \le x \le 2 \\ x, & 2 < x < 3 \\ 1, & 3 \le x \le 10 \end{cases}.$$

Sketch a graph of f, labeling points with open/closed circles as necessary, and evaluate $\int_0^{10} f(x)\,dx$.

Bonus: Let a and b be real numbers and f a function. If $\int_a^b f(x)\,dx = 0$ and $f(x) \ge 0$ for all x with $a \le x \le b$, is it necessarily true that $f(x) = 0$ for all x with $a \le x \le b$? Give a brief explanation of why if it's true, and a counterexample if it's false. If it is false, what additional assumption could we add to make the result true?