Chapter 6.4: The Second Fundamental Theorem

Calculus II

Spring 2021

College of the Atlantic

The Fresnel Sine Integral $S(x)$ is defined by

$$S(x) \equiv \int_0^x \sin(t^2)\, dt\ . \tag{1}$$

This integral arises in certain optics applications.

1. Sketch the integrand, $\sin(t^2)$.
2. Now sketch the general shape of $S(x)$. What is the large-x behavior of $S(x)$?
3. Evaluate the following:

$$\frac{d}{dx}S(x) \tag{2}$$

$$\frac{d}{dt}S(x) \tag{3}$$

$$\frac{d}{dx}5S(x) \tag{4}$$

$$\frac{d}{dx}S(x^2) \tag{5}$$

$$\frac{d}{dx}S(x)S(x) \tag{6}$$