# Class 11: Exploring a Particular Definite Integral Calculus II 

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1. Evaluate the following integral:

$$
\begin{equation*}
\int_{0}^{3} \sin \left(\frac{\pi t^{2}}{2}\right) d t \tag{1}
\end{equation*}
$$

You will need to write some python code to do this.
2. Now consider this:

$$
\begin{equation*}
S(x)=\int_{0}^{x} \sin \left(\frac{\pi t^{2}}{2}\right) d t \tag{2}
\end{equation*}
$$

(a) Is this a function of $t$ ?
(b) Is this a function of $x$ ?
3. Sketch the integrand of the integral in Eq. (2). Try it by hand before using python or wolfram alpha.
4. Make a rough sketch of of $S(x)$. What is the large- $x$ behavior of $S(x)$ ?
5. Define the function $S(x)$ using some python code.
6. Write some code that makes a plot of $S(x)$.
7. By the way, what is $\frac{d}{d x} S(x)$ ? Why?

