

% !TEX TS-program = sage

% The following lines are standard LaTeX preamble statements.

\documentclass[11pt, onside]{amsart}

\usepackage{geometry}

\geometry{letterpaper}

\usepackage[parfill]{parskip}

\usepackage{graphicx}

\usepackage{amssymb}

\usepackage{epstopdf}

\title{Brief Article}

\author{The Author}

% Only one command is required to use Sage within the LaTeX source:

\usepackage{sagetex}

\begin{document}

\maketitle

\section{Introduction}

This is an example of using Sage within a  $\TeX$  document. We can compute extended values like

$$32^{31} = \text{sage}\{32^{31}\}$$

We can plot functions like  $x \sin x$ :

$$\text{sageplot}[\text{width}=5\text{in}]\{\text{plot}(x * \sin(30 * x), -1, 1)\}$$

We can integrate:

$$\int \frac{x^2 + x + 1}{(x - 1)^3 (x^2 + x + 2)} dx = \text{sage}\{\text{integrate}((x^2 + x + 1) / ((x - 1)^3 * (x^2 + x + 2)))\}$$

\newpage

We can perform matrix calculations:

$$\text{sage}\{\text{matrix}([1, 2, 3], [4, 5, 6], [7, 8, 9])^3\}$$

$$AB = \text{sage}\{\text{Matrix}([1, 2], [3, 4])\} \text{sage}\{\text{Matrix}([5, 6], [6, 8])\} = \text{sage}\{\text{Matrix}([1, 2], [3, 4]) * \text{Matrix}([5, 6], [6, 8])\}$$

Plots are fun; here is a second one showing  $x \ln x$ . The `width` command in the source is sent to the `includegraphics` command in LaTeX rather than to Sage.

$$\text{sageplot}[\text{width}=5\text{in}]\{\text{plot}(x * \ln(x), 0, 2)\}$$

Sage understands mathematical constants and writes them symbolically unless it is told to produce a numerical approximation. The term  $e\pi$  below is not in the LaTeX source; instead it is the result of a Sage calculation, as is the numerical value on the other side of the equal sign.

The product of  $e$  and  $\pi$  is 
$$\text{sage}\{\pi * e\} = \text{sage}\{N(\pi * e)\}.$$

\end{document}

