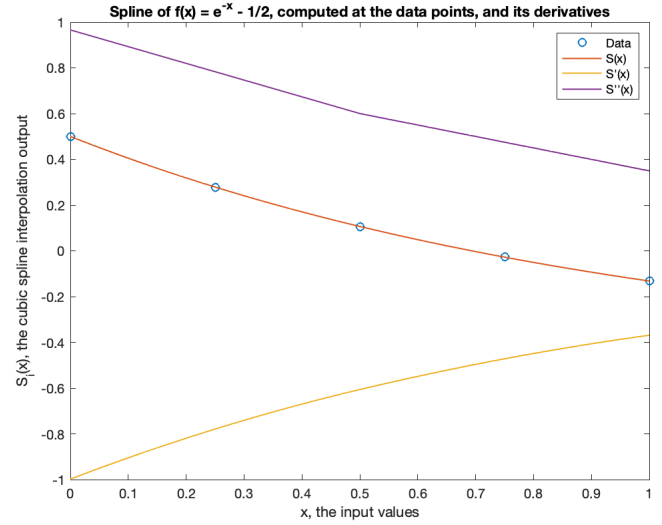


Part A

The function $f(x) = e^{-x} - \frac{1}{2}$, evaluated at $x = 0, 0.25, 0.5, 0.75, 1$, is given by the circular data points in the graphic. From these data points, a cubic spline with not-a-knot end conditions was constructed, and its first and second derivatives were computed. Each is shown, with their values graphed in intervals of $1/100$ th.

Since the spline is cubic, it takes on the form $f_i(x) = a_i + b_i x + c_i x^2 + d_i x^3$. The coefficients for the spline f are as follows:

-0.1218	0.4828	-0.9979	0.5000
-0.1218	0.3914	-0.7793	0.2788
-0.0835	0.3001	-0.6065	0.1065
-0.0835	0.2374	-0.4721	-0.0276



From which the derivatives are simple to construct. The approximations for $f'(0.5)$ and $f''(0.5)$ are $s'(0.5) \approx -0.6065$, $s''(0.5) \approx 0.6001$, and their absolute errors are given by $|s'(0.5) - f'(0.5)| \approx 7.9565e^{0.5}$ and $|s''(0.5) - f''(0.5)| \approx 0.0064$.

Part B