

Module Example Assignment

Chapter X, Sections Y-Z

Your Name

Date Assignment is Due

Problem Set

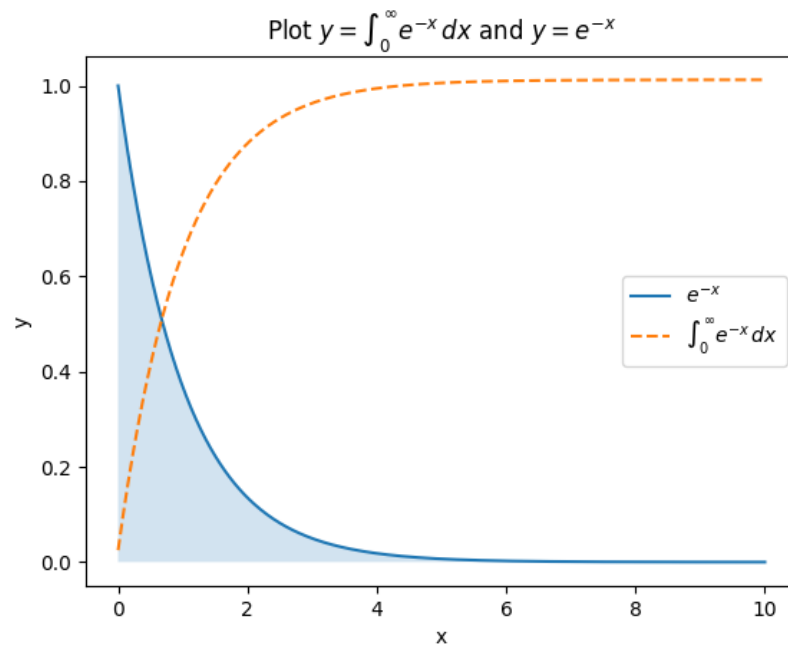
X.Y.1 Some exercise from the textbook that likely has inline latex like $\int_0^\infty e^{-x} dx$.

The answer to the exercise, generally has inline latex as well like $\int_0^\infty e^{-x} dx$. Often times, there are lines like the following which are all latex,

$$\int_0^\infty e^{-x} dx = [e^x]_0^\infty = \lim_{x \rightarrow \infty} (-e^{-x}) - (-e^{-0}) = 0 - (-1) = 1$$

Software Assignment

Some prompt assigned as a software assignment. For example, create a visualization representing $\int_0^{\infty} e^{-x} dx$.



```
import numpy as np
import matplotlib.pyplot as plt

# Define the function  $e^{-x}$ 
def f(x):
    return np.exp(-x)

# Generate x values from 0 to 10 (as infinity is not practical)
x = np.linspace(0, 10, 400)
y = f(x)

# Calculate the integral using numpy's cumulative trapezoidal rule
integral = np.cumsum(y) * (x[1] - x[0])

# Plot the function
plt.plot(x, y, label='$e^{-x}$')
plt.fill_between(x, y, alpha=0.2)

# Plot the integral
```

```

plt.plot(x, integral, label='$\int_0^{\infty} e^{-x} \, dx$', linestyle='--')

# Add labels and legend
plt.xlabel('x')
plt.ylabel('y')
plt.title('Plot $y=\int_0^{\infty} e^{-x} \, dx$ and $y=e^{-x}$')
plt.legend()

# Save the plot
plt.savefig("/workspace/module-example/software-assignment.png")

```