

ANSWER SHEET

1. Use substitution to evaluate the indefinite integral

$$\int \sin(4x) \, dx.$$

Answer: Take $u = 4x$. Then $du = 4 \, dx$, so $dx = \frac{du}{4}$. Now we plug these things into the integral:

$$\begin{aligned} \int \sin(4x) \, dx &= \int \sin(u) \frac{du}{4}, \\ &= \frac{1}{4} \int \sin(u) \, du, \end{aligned}$$

evaluate,

$$\frac{1}{4} \int \sin(u) \, du = -\frac{1}{4} \cos(u) + C,$$

and plug in what u was to get

$$-\frac{1}{4} \cos(4x) + C.$$

2. Find the area of the region under $y = e^t - t$ over the interval $0 \leq t \leq 1$.

Answer:

$$\begin{aligned} \int_0^1 e^t - t \, dt &= \left[e^t - \frac{t^2}{2} \right]_0^1, \\ &= \left(e^1 - \frac{(1)^2}{2} \right) - \left(e^0 - \frac{(0)^2}{2} \right), \\ &= e^1 - \frac{3}{2}. \end{aligned}$$