

HOMEWORK 7

1. (20 points)

Compute the arc length of:

(a) $f(x) = \ln(\sin(x))$ on the interval $[\pi/4, \pi/3]$.

(b) $f(x) = \frac{1}{3}(x^2 + 2)^{\frac{3}{2}}$ on the interval $[0, a]$.

2. (40 points)

Determine if the following integrals converge or diverge. If the integral converges, determine its value.

(a) $\int_{-\infty}^0 x e^{3x} dx$.

(b) $\int_e^{\infty} \frac{1}{x \ln(x)} dx$.

(c) $\int_{-7}^{\infty} \frac{1}{x^2 + 4x + 29} dx$.

3. (40 points)

Determine if the following integrals converge or diverge. If the integral converges, determine its value.

(a) $\int_1^5 x e^{3x} dx$.

(b) $\int_0^1 \frac{\ln(x)}{\sqrt[3]{x}} dx$.

(c) $\int_0^1 \ln(x) dx$.