

Problem set – Week 6

INTEGRATION (REVIEW)

1. Consider the parabolic segment $y = x^2$ between $x = 1$ and $x = 2$, and the force $F : \mathbb{R}^2 \rightarrow \mathbb{R}^2 : (x, y) \mapsto (xy, x)$. Compute the work of the force F along the parabolic segment.
2. Consider the line segment from $(0, 1)$ to $(1, 2)$. What is the surface area of the rotation of this line segment around the x -axis?
3. Consider the curve $t \mapsto (t^2, t^3)$ from $t = 1$ to $t = 3$. What is the length of this curve?
4. Consider the curve $t \mapsto (\cos t, \sin 2t)$ from $t = 0$ to $t = \pi/2$. Rotate this curve around the x -axis. What is the resulting volume?