

Final Exam Part II

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Name: _____

Section: 1

1. Find the distributional derivative of $f(x) := H(x) \sin x$.
2. Show Theorem 6.1 (2): Given a metric space (X, d) and $E \subseteq X$. If $p \in X$ is a limit point of E then every neighborhood of p contains infinitely many points of E .
3. Suppose the region $R \subseteq \mathbb{R}^2$ is bounded by a simple closed curve C . Show that

$$\text{area}(R) = \frac{1}{2} \oint_C -y \, dx + x \, dy$$

4. Find the area of the region bounded by the hypocycloid $x = a \cos^3 t$, $y = a \sin^3 t$ for $a > 0$.