Real Analysis Exam

Student Name: _____

ID: _____

Question 1 — Measure Theory — *2024 | Prof. Lebesque*

Given: Let (X, M, μ) be a measure space. Let $f_n \to f$ pointwise a.e. and $|f_n| \leq g \in L^1$.

To Prove:

$$\lim_{n\to\infty} \int f_n d\mu = \int f d\mu$$

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FORMAL PROOF

Given: **Prove the limit of the function $f(x) = 2x + 3$ as $x \to 1$.**

To Prove:

$$\lim_{x \to 1} (2x + 3) = 5$$

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FORMAL PROOF

Question 3 — Abstract Algebra — *2024 | Prof. Noether*

Given: **Let $\varphi : G \to H$ be a surjective homomorphism with kernel K.**

To Prove:

$$\frac{G}{K} \cong H$$

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FORMAL PROOF