Name: _____

MATH 308
Fall 2021
HW 14: Due 11/22

"If you're going to do something tonight that you'll be sorry for tomorrow morning, sleep late."

–Henny Youngman

Problem 1. (10pt) Do there exist integers a, b such that $2a+3b = 5$? Explain. Do there exist integers x, y such that $8x + 12y = 3$? Explain.

Problem 2. (10pt) Compute $\gcd(2^8 \cdot 3^5 \cdot 7^{10} \cdot 11 \cdot 19^6,\ 2^5 \cdot 3^8 \cdot 5^3 \cdot 11^2 \cdot 13 \cdot 17^3)$.

Problem 3. (10pt) Compute $\mathrm{lcm}(2^8 \cdot 3^5 \cdot 7^{10} \cdot 11 \cdot 19^6,\ 2^5 \cdot 3^8 \cdot 5^3 \cdot 11^2 \cdot 13 \cdot 17^3)$.

Problem 4. (10pt) Prove that if $a, b \in \mathbb{Z}$, then $ab = \gcd(a, b) \cdot \operatorname{lcm}(a, b)$.

Problem 5. (10pt) Use the Euclidean Algorithm to compute $\gcd(36, 98)$.

Problem 6. (10pt) Use the Euclidean Algorithm to find integers x, y such that $36x + 98y = \gcd(36, 98)$.