

202201 Math 122 A03 Quiz #5

#V00: _____

Name: _____

This quiz has 2 pages and 6 questions. There are 15 marks available. The time limit is 25 minutes. Math and Stats standard calculators are allowed, but not needed. Except when indicated, it is necessary to show clearly organized work in order to receive full or partial credit. Use the back of the pages for rough or extra work.

1. [2] Use the blank to indicate whether each statement is **True (T)** or **False (F)**. No reasons are necessary.

___ The remainder when -42 is divided by -5 is -2 .

___ For all $x \in \mathbb{R}$, $2\lfloor x \rfloor = \lfloor 2x \rfloor$.

___ $5 \mid 0$.

___ $(10100101)_2 = (A5)_{16}$.

2. [3] Find the base 9 representation of 2022.

3. [3] Prove that if $a \mid b$ and $2b \mid 5c$, then $a \mid 10c$.

4. [2] Let $n = 5^{55}7^{77}$. Explain why the Fundamental Theorem of Arithmetic implies that there does not exist an integer k such that $n = 14k$.

5. [3] Use the Euclidean Algorithm to compute $d = \gcd(644, 154)$, and then use your work to find integers x and y such that $d = 644x + 154y$.

6. [2] Use the blank to indicate whether each statement is **True (T)** or **False (F)**. No reasons are necessary.

___ For $n \in \mathbb{Z}$, if $\lfloor n/3 \rfloor = \lceil n/3 \rceil$ then n is a multiple of 3.

___ For positive integers a and b , it is possible to simultaneously have $\gcd(a, b) > \sqrt{ab}$ and $\text{lcm}(a, b) > \sqrt{ab}$.

___ If $a = 2^3 5^1 11^2$ and $b = 2^2 5^2 7^2$, then $\text{lcm}(a, b) = 2^3 5^2 7^2 11^2$.

___ For any integers a and b , if $\gcd(a, b) = 5$ then neither a nor b are divisible by 25.