Math 422, Homework 1

[Your name]

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1.1.1(b)(d)

"Suppose $|A| = m$ and $|B| = n$, where m and n are finite, and let $f : A \to B$ be a function from A to B.

(b) What can you say about m and n if f is one-to-on? if f is onto? if f is a bijection.

(d) How many possible one-to-one functions are there from A to B? How many possible functions are there from A to B? How many relations are there from A to B?"

Proof. □

1.2.6

"Prove that if G is a set with an associative binary operation $*$ such that both of the equations $a * x = b$ and $y * a = b$ have unique solutions whenever a and b are in G, then G is a group."

Proof. □

1.2.8

"Prove that if G is a group such that $g^2 = e$ for all $g \in G$, then G is abelian.."

Proof. □

1.3.4

"Let $p_1,\ p_2,\ \ldots,\ p_k$ be the first k prime numbers, and set $N_k = (p_1 \cdot p_2 \cdots p_k) + 1$. It is easy to see that N_k is prime for $1 \le k \le 4$. Is N_k always prime?"

Proof. □

i	r_i	q_i	u_i	v_i
-1		-	1	0
0		-	0	1
1				
2				

1.3.8

"Show that if $(a, b) = (a, c) = 1$, then $(a, bc) = 1$."

Proof. □

1.3.11(c)

"Suppose that $(a, b) = 1$. Show that $(a + b, a^2 + b^2)$ is equal to 1 or 2."

Proof. □

1.3.16(a)

"Let $F_0,\ F_1,\ F_2, \ldots$ be the Fibonacci Sequence. In particular, $F_0 = 0,\ F_1 = 1$, and for $n \geq 2$ $F_n = F_{n-1} + F_{n-2}$. Show that any pair of consecutive Fibonacci numbers are relatively prime."

Proof. □

[Not from book.]

"Find the gcd of and Bezout's coefficients for 15147 and 891800."

Proof. □

1.4.4

"Let n be a positive integer. Show that the relation on the integers $\mathbb{Z}$ defined by $a \sim b \Leftrightarrow n|(b - a)$ is an equivalence relation. (Theorem 1.4.3)."

Proof. □