

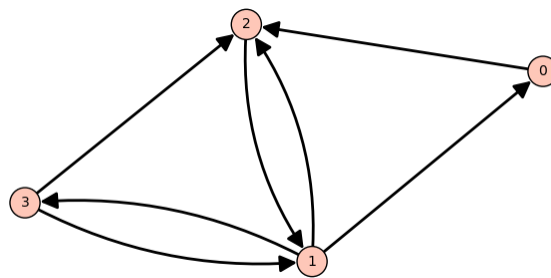
Math 1019N Final Exam Review

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Question 1.

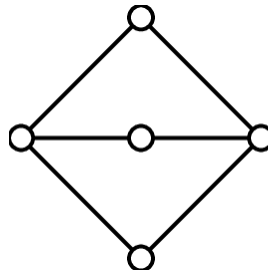
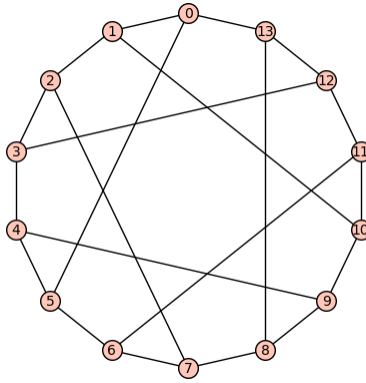
(a) Compute the Adjacency matrix of the following Digraph.



(b) Does a digraph always have to have zeros along the diagonal of its adjacency matrix?

Question 2.

Determine whether the following graph has a Hamilton circuit or Hamilton path.



Question 3.

Prove that the integers mod 5 is an equivalence relation

$$x \equiv y \pmod{5} \text{ if and only if } \frac{x-y}{5} \in \mathbb{Z}$$

Question 4.

Prove by mathematical induction that the sum of the first n integers is equal to

$$\frac{n(n+1)}{2}$$

Question 5.

Find a formula for the recurrence relation $a_n = 2 * a_{n-1} + 2^n, a_0 = 1$

Question 6.

Let f be the following map $f : \mathbb{R} \rightarrow \mathbb{R}$

$$f(x) = \lceil x \rceil$$

Is f a function? Is it one to one and onto? What is the domain, codomain and range of the f ?

Question 7.

Prove that if A, B are sets then $P(A) \cup P(B) \subseteq P(A \cup B)$. Where $P(A)$ is the power set of A .

Question 8.

Use the truth table to determine if the following argument is valid.

$$\begin{array}{l} p \rightarrow q \\ q \rightarrow r \\ \therefore p \rightarrow r \end{array}$$

Question 9.

Prove that $0.333\dots = \frac{1}{3}$, by using the geometric sequence.

Question 10.

Prove the following using propositional logic

$$\neg(p \vee (\neg p \wedge q)) \equiv \neg p \wedge \neg q.$$