CISC 2210 Spring 2018 Quiz 5

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1 Matrices

1.1 Perform the following matrix multiplication

Let $A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$

Find AB

1.2 Find the adjacency matrix that corresponds to the below graph

Let G be an undirected graph such that $G = (V, E, \gamma)$ such that: $V = \{1, 2, 3, 4\}$,
$E = \{a, b, c, d, e\}$

and γ is given by:

edge	endpoints
a	{1, 2}
b	{1, 2}
c	{3, 2}
d	{1, 3}
e	{1, 4}

.

2 Equivalence relations

1. Define R on $\mathbb{Z}$ such that for all $a, b \in \mathbb{Z}$ a R b means that $a - b$ is a multiple of 5. That is, $a - b = 5k$ for some $k \in \mathbb{Z}$. Prove that R is an equivalence relation.

2. Describe [0]. (The equivalence class for which 0 is the representative.)

3 Proofs

3.1 Direct Proof

Prove that $n^2 + n$ is even for all integers n.

3.2 Indirect Proof

Prove that $\sqrt{2}$ is not rational.