

Name: _____

Please show all work and justify your answers.

1. Compute the determinant of $\begin{bmatrix} 2 & 3 & 0 & 2 \\ 4 & 3 & 2 & 1 \\ 6 & 0 & 0 & 3 \\ 7 & 0 & 0 & 4 \end{bmatrix}$. Show work. Is this matrix invertible?

2. You are dealt 5 playing cards from a shuffled standard 52 card deck. What are your chances of getting a flush (straight/royal flushes not included)? Explain your reasoning.

3. Prove that for $n \geq 1$

(a) $C(n, 0) + C(n, 1) + C(n, 2) + \dots + C(n, n) = 2^n$

(b) $C(n, 0) - C(n, 1) + C(n, 2) - \dots \pm C(n, n) = 0$

4. The likelihood that you stop being a belieber t weeks after becoming one is given by the probability distribution $p(t) = mt + 0.2$ for $0 \leq t \leq 10$ (where m is a constant) and $p(t) = 0$ for all other t .

(a) Find m .

(b) On average how soon do people stop being beliebers?

(c) If ten thousand people go a Justin Bieber concert and instantly become beliebers, how long after the show will only half of them remain beliebers?

1	2	3	4	total (40)