Your Preferred Name

Student ID #

- Do not open this quiz until you are told to begin. You will have 30 minutes for the quiz.
- Check that you have a complete quiz. There are 3 questions for a total of 23 points.
- You are allowed to have one index card of handwritten notes (both sides). Only basic non-graphing scientific calculators are allowed, though you should not need one.
- Cheating will result in a zero and be reported to the Dean's Academic Conduct Committee.
- **Show all your work**. Unless explicitly stated otherwise in a particular question, if there is no work supporting your answer, you will not receive credit for the problem. If you need more space to answer a question, continue on the back of the page, and indicate that you have done so.

Question	Points	Score
1	6	
2	10	
3	7	
Total:	23	

1. (6 points) Consider the polynomial

$$p(x) = 3x^3 + 4x^2 + x + 1.$$

Express $p(x)$ in the form

$$p(x) = a(x+1)^3 + b(x+1)^2 + c(x+1) + d$$

by solving an appropriate linear system. (*Hint*: $(u+v)^3 = u^3 + 3u^2v + 3uv^2 + v^3$.)

2. Consider the following linear system:

$$\begin{aligned} 4x_1 + 2x_2 - x_3 + 2x_4 &= 6 \\ 2x_1 + x_2 + x_3 + 4x_4 &= 3 \\ -x_1 + 0x_2 - x_3 + x_4 &= 0 \end{aligned}$$

   (a) (4 points) Give an echelon form matrix equivalent to the augmented matrix of the linear system.

   (b) (4 points) Give a reduced echelon form matrix equivalent to the augmented matrix of the linear system.

   (c) (2 points) What is the general solution of the linear system?

3. Give examples satisfying the following conditions. You are <u>not required</u> to justify your answers.

   (a) (2 points) A linear system *not* in echelon form but whose augmented matrix *is* in echelon form.

   (b) (3 points) Two different linear combinations which result in the same vector.
   <u>Give a sketch</u> of the situation.

   (c) (2 points) A point $\vec{u}$ in $\mathbb{R}^4$ which is not a linear combination of four vectors $\vec{v}_1, \vec{v}_2, \vec{v}_3, \vec{v}_4$ in $\mathbb{R}^4$.