

# Take-Home Quiz 8

(Due at 7:00 p.m. on Fri. November 2, 2007)

Division:

ID#:

Name:

1. Let  $\pi = (5, 2, 6, 8, 4, 1, 3, 7)$  be a permutation. Find the number of inversions  $\ell(\pi)$  and its sign  $\text{sign}(\pi)$ .

2. Add missing terms to equate the following.

$$\begin{vmatrix} a_{1,1} & a_{1,2} & a_{1,3} & a_{1,4} \\ a_{2,1} & a_{2,2} & a_{2,3} & a_{2,4} \\ a_{3,1} & a_{3,2} & a_{3,3} & a_{3,4} \\ a_{4,1} & a_{4,2} & a_{4,3} & a_{4,4} \end{vmatrix} = a_{1,1}a_{2,2}a_{3,3}a_{4,4} - a_{1,1}a_{2,2}a_{3,4}a_{4,3} - a_{1,1}a_{2,3}a_{3,2}a_{4,4} + a_{1,1}a_{2,3}a_{3,4}a_{4,2} \\ + a_{1,1}a_{2,4}a_{3,2}a_{4,3} - a_{1,1}a_{2,4}a_{3,3}a_{4,2} - a_{1,2}a_{2,1}a_{3,3}a_{4,4} + a_{1,2}a_{2,1}a_{3,4}a_{4,3} + a_{1,2}a_{2,3}a_{3,1}a_{4,4} \\ - a_{1,2}a_{2,3}a_{3,4}a_{4,1} - a_{1,2}a_{2,4}a_{3,1}a_{4,3} + a_{1,2}a_{2,4}a_{3,3}a_{4,1} + a_{1,3}a_{2,1}a_{3,2}a_{4,4} - a_{1,3}a_{2,1}a_{3,4}a_{4,2}$$

3. Find all  $\lambda$  such that  $(\lambda I - A)\mathbf{x} = \mathbf{0}$  has a nontrivial solution, i.e.,  $\mathbf{x} \neq \mathbf{0}$ , where

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -18 & 15 & 4 \end{bmatrix}, \quad \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}, \quad \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}. \quad \text{Show work!}$$

Message 欄 (何でもどうぞ) : ICU をどのようにして知りましたか。ICU をより魅力的にするにはどうしたらよいでしょうか。[HP 掲載不可は明記のこと]