18.06 (Fall '13) Problem Set 10

This problem set is due Thursday, December 5, 2013 by 4pm in E17-131.

1. The $n \times n$ matrices form a vector space of dimension n^2. Let A and B be two matrices in this space. Which of the following maps from the space of $n \times n$ matrices to itself or to $\mathbb{R}$ are linear? Justify your answers.

    a) $X \mapsto AXB$.

    b) $X \mapsto X^T AX$.

    c) $X \mapsto AX + XB$.

    d) $X \mapsto \text{trace}(X)$.

    e) $X \mapsto \det(X)$.

2. Is the transformation on functions that takes $f(x)$ to $f(x^2 + x)$ linear? Justify your answer.

3. Do Q37 from 7.2.

4. Do Q35 from 7.2.

5. Do Q5 from 7.2.

6. Do Q23 from 7.2.

7. Do Q8 from 9.3.

8, 9, 10: Free points!