EXTRA CREDIT PROBLEM #3
Math 6014

Let $k \geq 2$ be an integer, let $G$ be a $k$-connected graph on $n$ vertices, let $v_1, v_2, \ldots, v_k$ be distinct vertices of $G$ and let $n_1, n_2, \ldots, n_k$ be positive integers with $n_1 + n_2 + \cdots + n_k = n$. Prove that $G$ has disjoint connected subgraphs $G_1, G_2, \ldots, G_k$ such that for $i = 1, 2, \ldots, k$ the graph $G_i$ has $n_i$ vertices and $v_i \in V(G_i)$.

For $k = 2$ this is not hard and can serve as an additional weekly problem, but for $k \geq 3$ it is substantially harder. I will award $1/2^{k-3}$ units of extra credit for a proof for every $k \geq 3$. Thus a proof for all $k \geq 3$ will earn you double the usual extra credit.

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**Instructions:** Homework rules apply, including an honor pledge, except that you may collaborate with students in the same class by submitting a joint paper. A paper with $k$ authors will earn each author $1/k$ of the credit. Only complete solutions will be accepted. To claim credit please submit a pdf file by e-mail on or before November 25.