1067-05-2342   **David S. Rolnick*** (`drolnick@mit.edu`). *On-line Degree Ramsey Numbers: Building and Painting Graphs, One Edge at a Time.*

On-line Ramsey theory studies a graph-building game between two players. The player called Builder builds edges one at a time, and the player called Painter paints each new edge red or blue after it is built. The graph constructed is called the *background graph.* Builder's goal is to cause the background graph to contain a monochromatic copy of a given *goal graph*, and Painter's goal is to prevent this. In an S_k-*game*, the background graph is constrained to have maximum degree no greater than k. The on-line degree Ramsey number $\mathring{R}_\Delta(G)$ of a graph G is the minimum k such that Builder wins an S_k-game in which G is the goal graph.

Butterfield et al. classified the graphs G satisfying $\mathring{R}_\Delta(G) \leq 3$, but $\mathring{R}_\Delta(G)$ is unknown for virtually all other G. We present the following results:

1. Completion of the investigation begun by Butterfield et al. into the values $\mathring{R}_\Delta(C_n)$. We show that $\mathring{R}_\Delta(C_n) = 4$ for all $n \geq 3$.

2. Classification of the trees T such that $\mathring{R}_\Delta(T) = 4$.

3. Identification of various examples of graphs G which are neither trees nor cycles and which satisfy $\mathring{R}_\Delta(G) = 4$. These are the first such graphs to be identified.