# Second Repeat of the Second Midterm Test

1. Let G be an interval graph. We constuct the graph G' from G by adding a new vertex to it, and connecting it to all the vertices of G. Is G' and interval graph or not?

2. Let the vertices of the graph G be $v_{i,j}$, $1 \leq i, j \leq 4$, and let the vertices $v_{i,j}$ and $v_{k,l}$ be adjacent if and only if $|i - k| + |j - l| = 1$. Determine the values $\nu(G), \tau(G), \rho(G), \alpha(G)$ for G.

3. Let the vertices of the graph G be $v_1, v_2, \ldots, v_{15}$, and let the vertices v_i and v_j be adjacent if and only if $|i - j| = 1, 5$ or 9. Determine $\chi_e(G)$, the edge-chromatic number of the graph G.

4. Determine a minimum S, T-cut in the network below.
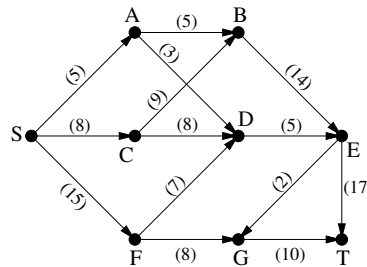
5. Let the vertices of the graph G be $v_1, v_2, \ldots, v_{20}$, and let the vertices v_i and v_j be adjacent if and only if $|i - j| = 1$ or 5. Determine the vertex- and edge connectivity numbers ($\kappa(G)$ and $\lambda(G)$) for G.

6. Determine a minimum weight spanning tree in the graph below for all the values of the positive real parameter p.
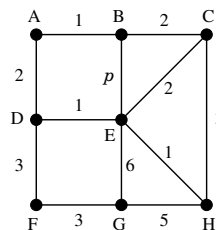
Total work time: 90 min.
The full solution of each problem (including explanations) is worth 10 points. Show all your work! Results without proper justification or work shown deserve no credit.
Notes and calculators (and similar devices) cannot be used.
Grading: 0-24 points: 1, 25-33 points: 2, 34-42 points: 3, 43-51 points: 4, 52-60 points: 5.