Comments on homework 1

1. Some groups did not reproduce the results in Table 2.2 of the PMWIN manual. You will get another chance to explain the effect of the parameters on the volume out. For example, why does the total volume out not double when either the head difference or the horizontal hydraulic conductivity doubles? How can the effect of the recharge rate be explained?

2. No problems.

3. No major problems.

5. In dimensional analysis, one writes $K = f(d, g, \rho, \mu)$. With 5 variables and 3 dimensions (mass, length, and time), one gets two dimensionless groups. To proceed further, argue that (1) since the weight drives the flow, the density and gravity should be considered together as $\rho g$ and (2) since $K$ does not have dimensions of mass, the mass units must cancel. Therefore, write $K = f(\rho g/\mu, d)$ and conclude that there is only one group, which must be constant. Then $K \propto \rho g d^2/\mu$.

7. The main confusion here was the fuzziness of the upper limit for the Reynolds number. To be safe, you can require the Reynolds number to be smaller than 1.