It is your responsibility to demonstrate that you have mastered the material of the class. Use the computers to validate your solutions, and to expedite basic calculations. Solution formulas alone, such as provided by MAPLE do not earn much credit. Much more important are sound justifications and explanations, and convincing demonstrations that you have mastered the concepts and solution methods from this class. Scratch work, such as formulas scattered across the page without clear logical order, will be ignored and earn zero credit.

1. Match each of the slope fields above to one of the differential equations given above.

2. Which of the differential equations listed above are a. linear, b. autonomous, and c. which of the first four differential equations A. through D. are exact?

3. Use Euler’s method with step size $\Delta x = 0.1$ to find approximate values of solution of the initial value problem $y' = x^2 - y$, $y(1) = 3$ at $x = 1.1$ and $x = 1.2$.

4. Find all solutions of the following initial value problems.
   
   Demonstrate your understanding of diverse solution methods – a solution formula is easily obtained with MAPLE, and it alone earns little credit.

   a. $xy' = y(2 - y)$, $y(2) = 1$.
   b. $y' = \frac{2y}{x} + x$, $y(2) = 3$.
   c. $x(1 - y)y' + y(1 - x) = 0$, $y(3) = 2$.

5. Find the maximal intervals on which the solutions of the previous problem exist.