Math.Econ.Anal.MakeUp.Test.2. 15.dec.2.

1. (6+(2+2) points)
   A) There are two urns containing colored balls. The first urn contains 60 red balls and 40 blue balls. The second urn contains 1 red balls and 9 blue balls. One of the two urns is randomly chosen (both urns have probability 50% of being chosen), and then a ball is drawn at random from the chosen urns. If a red ball is drawn, what is the probability that it comes from the first urn?
   B) There are 10 black and 20 white balls in a box. Suppose that we DO NOT put back the balls after the drawings.
   Ba) What is the chance of drawing firstly 2 white and then 4 black balls?
   Bb) What is the chance of drawing 2 white and then 4 black balls if the order is irrelevant?

2. (4+3+3 points)
   A) Toss a fair coin two times, and let h be equal to 1, if two heads are tossed, otherwise h is zero. Compute $E[h]$ and $Var[h]$!
   B) Solve the following differential equation! $y'(x) = 2y(x), \;\; y(0) = 9;$.
   C) Solve the following differential equation! $y'(x) = 2x, \;\; y(0) = 9;$.

3. (4+6 points)
   A) Compute the $f'_x, f'_y, f''_{yy}, f'_{yx}$ partial derivatives of the following function: $f(x, y) = x^3y^6 + y$.
   B) Find the critical point of the following function and determine its type! $x^2 - 2xy - 2x + 8$.

4. (2+3+2+3 points)
   Compute the following integrals:

   (a) $\int \sqrt[9]{-x^5} + (5x)^6 + \frac{3}{2x}\, dx$

   (b) $\int x \cdot \cos(5x)\, dx$

   (c) $\int_2^5 1 - 2x\, dx$

   Solve the following DE: $y'(x) = 3x^2, y(1) = 2$.