A. Test 2. Econ.Anal 13.dec.02. NEPTUN: Name:

1. Find the extremal value (and determine its type) of the function $f(x, y) = 2x^2 - xy + 2y^2 - 2x + 4y + 2x$!
   (a) Compute the partial derivatives of f up to second order!
   (b) Find the location of the extremal value!
   (c) Determine the type of the extremal value!
2. (a) Compute the $\int f(x)\,dx$ indefinite integrals of the following functions!
      i. $\sqrt[3]{4x^8} + \sqrt[4]{(3x)^7} + \frac{8}{x^8}$
      ii. $\frac{3}{1+16x^2}$
      iii. $\cos 3x + \sin(-3x)$
   (b) Compute $\int_0^{\pi} \sin(-x)\,dx$!
3. (a) There are 10 black and 5 white balls in a box. Suppose that we DO put back the balls after the drawings.
      i. What is the chance of drawing firstly 3 white and then 2 black balls?
      ii. What is the chance of drawing 3 white and then 2 black balls if the order is irrelevant?
   (b) Consider a sample space Ω comprising four possible outcomes $\Omega = \{\omega_1, \omega_2, \omega_3, \omega_4\}$. Suppose that to the four possible outcomes the following probabilities are assigned:

$$P(\omega_1) = 2/10, \quad P(\omega_2) = 3/10, \quad P(\omega_3) = 1/10, \quad P(\omega_4) = 4/10.$$

   Define two events: $E = \{\omega_1, \omega_2\}$, $E = \{\omega_2, \omega_3\}$ Compute $P(E|F)$, the conditional probability of E given F !
4. (a) Compute the following improper integral! $\int_1^{\infty} 1/x^{77}\,dx$
   (b) There are two urns containing colored balls. The first urn contains 100 red balls and 0 blue balls. The second urn contains 10 red balls and 90 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 one of the two urns. If a red ball is drawn, what is the probability that it comes from the first urn?