Graduation Exam-Spring 2014

CALCULUS

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1. Determine the convergence or the divergence of the following series. You must justify your answer.

   (a)
   $$\sum_{n=0}^{\infty} \frac{n^2}{2^n}$$

   (b)
   $$\sum_{n=0}^{\infty} \frac{(-1)^n n}{n+1}$$

2. Find the points on the surface $z^2 - xy = 4$ closest to the origin.

3. Evaluate
   $$\int_C \mathbf{F} \cdot d\mathbf{r}$$
   where $\mathbf{F}(x, y, z) = (z,\ xy,\ -y^2)$ along a curve C given by $\mathbf{r}(t) = (t^2,\ t,\ \sqrt{t})$ for $0 \leq t \leq 1$.