HW #11

Question 1. Determine whether the following function is a coercive function or not.

(1) $f(x, y) = x^4 + y$

(2) $f(x, y) = x^2 + y^2 + (x + y)^2$

Question 2. A neighborhood health clinic has an annual budget of $3,000,000. They want to allocate the budget so as to maximize the number of patient visits, V, which is given as a function of the number of doctors, D, and the number of nurses, N, by

$$V = 100 D^{2.4} N^{1.2}$$

A doctor's salary is $200,000; nurses get $50,000. How many doctors and nurses should the clinic hire?

Question 3. Find all the point(s) on the surface $y^2 = 9 + xz$ that are closest to the point $(0, 0, 0)$, and compute the distance.

Question 4. Determine whether

$$f(x, y, z) = x^2 + y^2 + z^2 + 1$$

has a global maximum and/or minimum on the domain

$$\{(x, y, z) \mid x^2 + y^2 - 2z^2 \leq 0, \ x + y + z \leq 3\}$$

If they exist, find the values.