HW #5

CALCULUS III

Question 1. Let

$$\vec{r}(t) = \left\langle \frac{e^t \sin(t)}{\sqrt{2}}, \frac{e^t \cos(t)}{\sqrt{2}}, 1 \right\rangle$$

Find the arclength parametrization, starting from $\left(0, \frac{1}{\sqrt{2}}, 1\right)$, to the direction of increasing t.

Question 2. Let

$$\vec{r}(t) = \langle 3\cos(t) - 4, 3\sin(t), -4t \rangle$$

Find the arclength parametrization, starting from $(-1, 0, 0)$, to the direction of increasing t.

Question 3. Find and sketch the domain of a function of two variables.

(1)

$$f(x, y) = \ln(x - y)$$

(2)

$$f(x, y) = \frac{\ln(x - 1)}{\sqrt{y^2 - x}}$$

Question 4. Consider the function $f(x, y) = x^2 + y^2 + 1$.

(1) Sketch the contour map.
(2) Sketch the graph with horizontal traces.

Question 5. Consider the equation $x^2 + y^2 - z^2 = 1$, implicitly defining z as a function of x and y.

(1) Sketch the contour map.
(2) Sketch the graph with horizontal traces.