Math 53 Discussion

Practice Problems: Midterm 1 Review

1) Find the maximum and minimum of $f(x, y, z) = 2x + 2y + z$ subject to $x^2 + y^2 + z^2 = 9$.

2) Find the points on the surface $xy^2z^3 = 2$ closest to the origin.

3) Sketch $r(\theta) = \sin\theta/\theta$.

4) Use the Chain Rule to find du/dp where $u = x^2y^3$, $x = p + 3p^2$, $y = pe^p$.

5) Find the directional derivative of $f = x^2e^{-y}$ in the direction towards $(2, -3)$ from the point $(-2, 0)$.

6) You have a circle radius a centered at $(0, a)$ and a horizontal line L sits tangent to the circle at $(0, 2a)$. You're standing at the origin and flying a kite at an angle θ from the positive x-axis, as θ goes from 0 to π. The line to the kite remains taut, and the kite remains on the line L. Let C be the kite and A the point of intersection of the kite with the circle.

Consider the point P obtained by forming a right triangle with A and C as below. Determine the coordinates of P in terms of θ and a.