

1. Archaeopteryx is an extinct beast that is generally regarded to have been the first bird. Here are the lengths in centimeters of the femur and humerus for five fossil specimens that preserved both bones.

Femur (y)	38	56	59	64	74
Humerus (x)	41	63	70	72	84

- (a) Determine the least-squares regression line.
- (b) If an archaeopteryx had a humerus of length 69 cm, how long would you predict that its femur was?
2. Let $f(x, y) = 4xy - x^3 - 2y^2$
- (a) Find and classify all critical points of f .
- (b) Find the maximum value of $f(x, y)$ on the unit disk $\{(x, y) \mid x^2 + y^2 \leq 1\}$.