

## 14.2: More Partial Derivatives Tangent Lines and Planes

Calculus III

College of the Atlantic

- The quantity  $Q$  of tofu, in pounds per week, purchased at a store is a function  $Q(t, s)$  of the price per pound  $t$  of tofu and the price per pound  $s$  of seitan.
  - What is the meaning of  $Q(2, 3) = 65$ ?
  - What is the sign of  $Q_t$ ?
  - What is the sign of  $Q_s$ ?
  - What is the meaning of  $Q_s(2, 3) = 18$ ?
- Let  $f(t)$  be the height of a sunflower plant in inches, where  $t$  is the number of days since the plant germinated. On day 20, the plant is 45 inches tall and is growing at 0.5 inches/day.
  - How tall is the plant on day 48?
  - How tall is the plant on day  $t$ ?
  - Could you use your answer to the above question to reliably predict the height of the plant on day 50? Day 100? Day 2?
- Suppose that  $f(2) = 3$  and  $f'(2) = -0.4$ .
  - Estimate  $f(2.4)$ .
  - Write down the tangent line approximation of  $f(x)$  at  $x = 2$ .
- Let  $g(x) = x^2$ . Write down the tangent line approximation to  $g(x)$  at  $x = 3$ .
- Let  $f(x) = x^2 + y^2$ .
  - Find the equation of the plane that is tangent to  $f(x, y)$  at the point  $(1, 2)$ .
  - Use the tangent plane to approximate  $f(0.9, 2.2)$  and compare it to the exact value.
  - Is your approximation above or below the exact value? Explain this geometrically.