

Question 2

Temperature is $T(x, y) = 80 - 2x^2 - y^2$ degrees Celsius, with distance in centimeters.

Tasks

1. Find $T_x(3, 4), T_y(3, 4)$ with units.
2. Interpret signs and magnitudes.
3. Estimate separate changes for 0.05 cm moves in $+x$ and $+y$.

Question 2 – Solution

Strategy. Read each partial as temperature change per centimeter with the other coordinate fixed.

Step 1: Rates $T_x = -4x$, $T_y = -2y$, so $T_x = -12\text{ }^\circ\text{C/cm}$ and $T_y = -8\text{ }^\circ\text{C/cm}$ at $(3, 4)$.

Step 2: Meaning Both directions cool; the x trace is locally steeper.

Step 3: Estimates $\Delta T_x \approx -12(.05) = -0.60^\circ\text{C}$ and $\Delta T_y \approx -8(.05) = -0.40^\circ\text{C}$.