

1. Let $f(x) = 5x^2 - 4x + 7$.

(a) Find a general formula for Δy .

(b) Find a general formula for dy .

(c) If x changes from 2 to 2.02 find each of the following.

i. Δx

ii. Δy

iii. dx

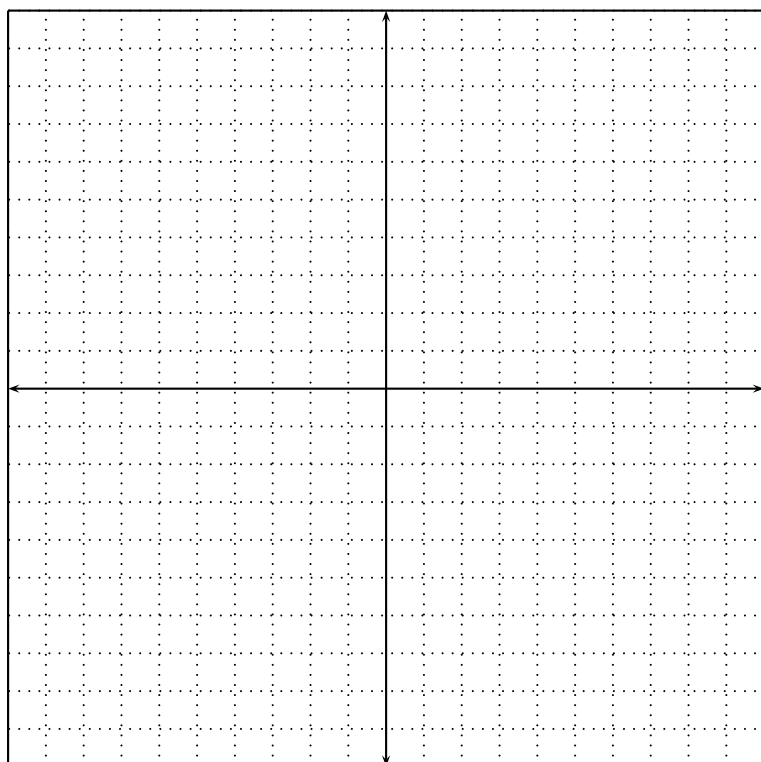
iv. dy

2. Let $f(x) = 6x - x^2$. Use the grid below to complete each of the following tasks.

(a) Sketch the graph of f .

(b) Find the equation of the tangent line to the graph of f at the point whose x -coordinate is 1. Sketch this tangent line of the graph of f .

(c) Mark and label Δx , Δy , dx , and dy on the graph if x changes from 1 to 2.



3. Let $f(x) = 7x^5 - 4x^3 + 2x + 5$. Find a linear approximation for $f(0.97)$.

4. A silo has the shape of a right circular cylinder surmounted by a hemisphere. The altitude of the cylinder is exactly 50 feet. The circumference of the base is measured at 30 feet, with a maximum error in measurement of ± 6 inches. Calculate the volume of the silo from these measurements and use differentials to estimate the maximum error in the calculation.

5. Assuming that the equation determines a differentiable function f such that $y = f(x)$, find $f'(x)$.

(a) $x \sin y + y \sin x = 1$

(b) $x^2(x - y)^2 = x^2 - y^2$

6. Assuming that the following equation determines a function f such that $y = f(x)$, use implicit differentiation to show that $y'' = \frac{10}{9}y^4$.

$$x^2y^3 = 1$$

7. Find the equation of the tangent line to the graph of $(x^2 + y^2)^2 = 50xy$ at the point $(2, 4)$.