Calculus 1 Workbook

Implicit differentiation

krista king MATH

IMPLICIT DIFFERENTIATION

■ 1. Use implicit differentiation to find dy/dx at $(3,4)$.

$$4x^3 - 3xy^2 + y^3 = 28$$

■ 2. Use implicit differentiation to find dy/dx.

$$5x^3 + xy^2 = 4x^3y^3$$

■ 3. Use implicit differentiation to find dy/dx.

$$3x^2 = (3xy - 1)^2$$

■ 4. Use implicit differentiation to find dy/dx.

$$\sin(2x + 5y) = \cos^2 x + \cos^2 y$$

■ 5. Use implicit differentiation to find dy/dx.

$$e^{2xy} = 3x^3 - \ln(xy^2)$$

■ 6. Use implicit differentiation to find dy/dx at $(0,2)$.

$$\frac{2x - y^3}{y + x^2} = 5x - 4$$

EQUATION OF THE TANGENT LINE WITH IMPLICIT DIFFERENTIATION

■ 1. Use implicit differentiation to find the equation of the tangent line to $5y^2 = 2x^3 - 5y + 6$ at $(3,3)$.

■ 2. Use implicit differentiation to find the equation of the tangent line to $5x^3 = -3xy + 4$ at $(2, -6)$.

■ 3. Use implicit differentiation to find the equation of the tangent line to $4y^2 + 8 = 3x^2$ at $(6, -5)$.

■ 4. Use implicit differentiation to find the equation of the tangent line to $2x + 3y - 5 = \ln(x^5 + y^5)$ at $(1,0)$.

■ 5. Use implicit differentiation to find the equations of the tangent and normal line to $\cos x = \sin(2y) + 9$ at $(\pi/2,\pi)$.

■ 6. Use implicit differentiation to find the equation of the tangent line to $4x^2 - xy + y^2 = 6$ at the points in the second and third quadrant when $x = -1$.

HIGHER-ORDER DERIVATIVES

■ 1. Find the second and third derivatives of the function at $x = -1$.

$$y = 2x^5 - 3x^4 + x^3 + x^2 - 7$$

■ 2. Find the second derivative of the function $y = -3x^{\frac{2}{3}} + x^{-\frac{1}{2}}$.

■ 3. Find the second derivative of the function.

$$y = -3x^7 \sin x$$

■ 4. Find the second and the third derivatives of the function.

$$y = \ln(x^5\sqrt{x})$$

■ 5. Find the second derivative of the function.

$$y = \frac{2x}{\sin(x^2)}$$

■ 6. Find the second derivative of the function at $x = 0$.

$$y = \frac{e^x}{4x - 9}$$

SECOND DERIVATIVES WITH IMPLICIT DIFFERENTIATION

■ 1. Use implicit differentiation to find d^2y/dx^2.

$$2x^3 = 2y^2 + 4$$

■ 2. Use implicit differentiation to find d^2y/dx^2.

$$4x^2 = 2y^3 + 4y - 2$$

■ 3. Use implicit differentiation to find d^2y/dx^2 at $(0,3)$.

$$3x^2 + 3y^2 = 27$$

■ 4. Use implicit differentiation to find d^2y/dx^2 at $(2,1)$.

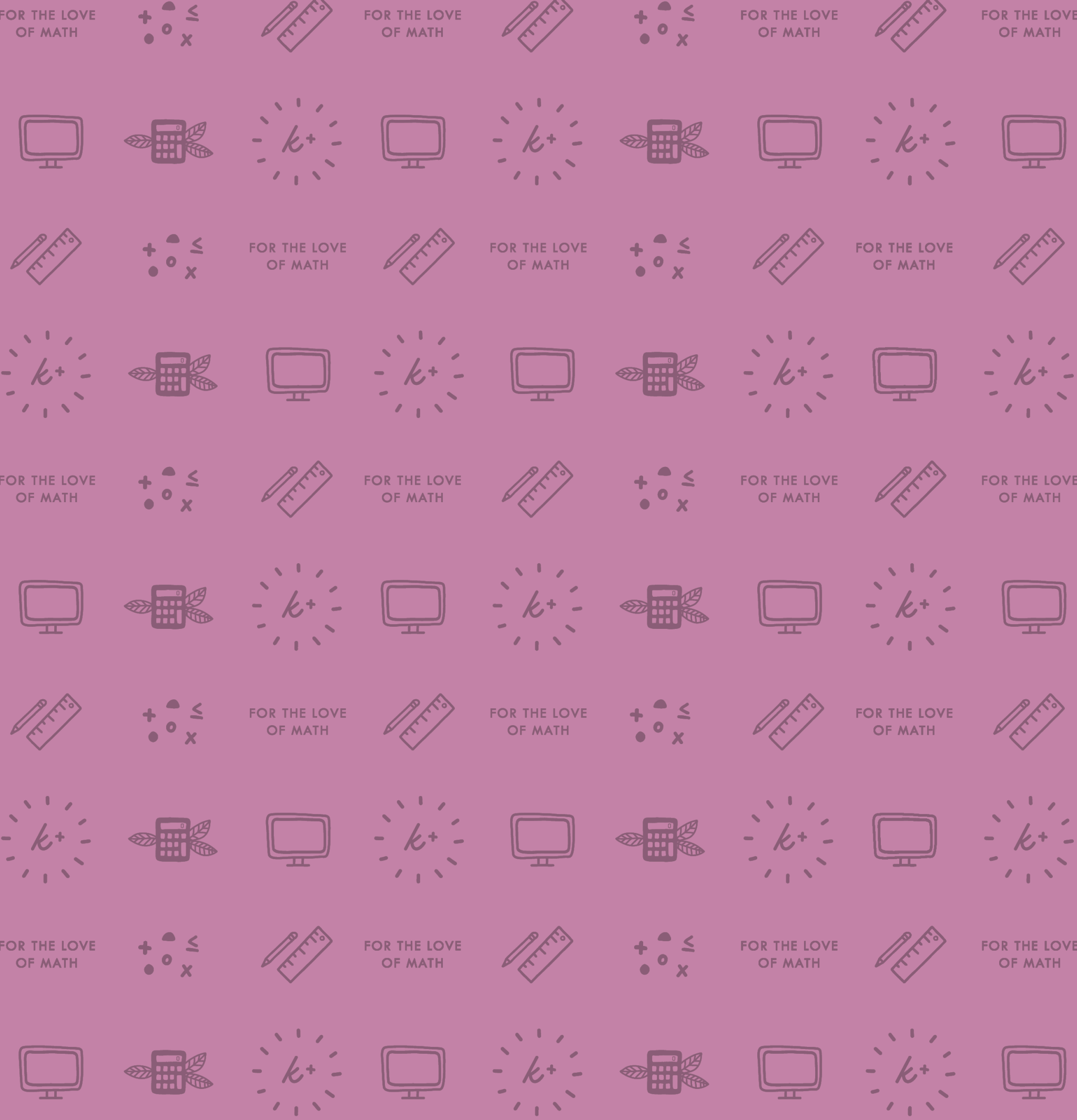
$$e^{x-2y} = 2x - y$$

■ 5. Use implicit differentiation to find y''.

$$y \sin x = 7 - 2y^2$$

■ 6. Use implicit differentiation to find y'' at $(0,3)$.

$$e^{2y} - 2x = y^4 - 2$$



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