

WORKSHEET 4

Problem 1. Where is the function $f(x) = \frac{x^2 - 4}{x + 1}$ not differentiable?

Answer. It is not differentiable only when $x = -1$.

Problem 2. For each of the following functions, find the equation of the secant line passing through the points where x has the given values.

a) $f(x) = x^2 + 2x$, $x = 3$, $x = 5$.

b) $f(x) = 5/x$, $x = 10$, $x = 15$.

Answer.

a) $y = 10x - 5$

b) $y = -x/30 + 5/6$

Problem 3. Use the definition of the derivative to calculate $f'(3)$.

a) $f(x) = 3x - 7$

b) $f(x) = -4x^2 + 9x + 2$

c) $f(x) = x^2 + 2x + 1$

d) $f(x) = 12/x$

e) $f(x) = \sqrt{x}$

f) $f(x) = \sqrt{2x}$

Answer.

a) 3

b) -15

c) 8

d) $-4/3$

e) $1/(2\sqrt{3})$

f) $1/\sqrt{6}$

Problem 4. For each of the following functions, calculate the equation of the tangent line passing through the point where x has the given value.

a) $f(x) = x^2 + 2x$, $x = 3$

b) $f(x) = 5/x$, $x = 10$

Answer.

a) $y - 15 = 8(x - 3)$

b) $y - 1/2 = (-1/20)(x - 10)$

Problem 5. The revenue in dollars generated from the sale of x picnic tables is given by $R(x) = 20x - \frac{x^2}{500}$.

a) Find the revenue when 1000 tables are sold.

b) Find the *marginal* revenue when 1000 tables are sold.

c) Estimate the revenue from selling 1001 tables by finding $R'(1000)$.

d) Determine the actual revenue from selling 1001 tables.

e) Compare your answers to (c) and (d).

Answer.

a) $R(1000) = 18000$

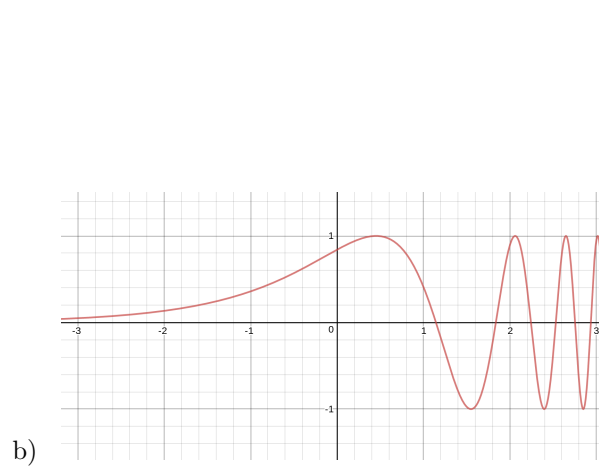
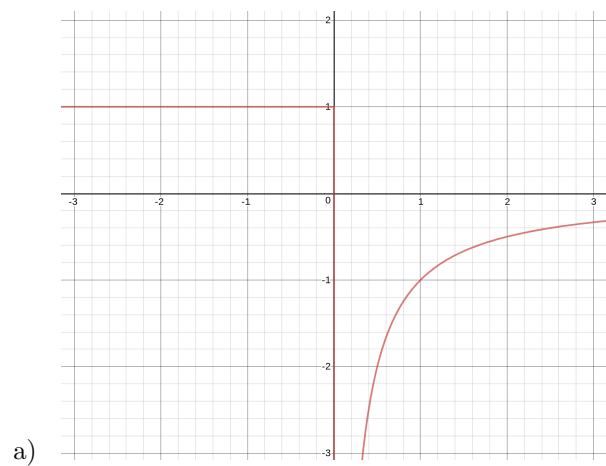
b) $R'(1000) = 16$

c) $R(1001) \approx R(1000) + R'(1000) = 18016$

d) $R(1001) = 18015.998...$

e) The numbers are quite close!

Problem 6. Sketch a graph of the derivative of each of the following functions.



Answer.

