

Principles of Calculus Modeling: An Interactive Approach by Donald Kreider, Dwight Lahr, and Susan Diesel
Exercises for Section 2.6

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1. (1 pt)

Find the equation of the straight line tangent to the curve

$$y = -3x^2 + 6x - 5$$

at the point (2, -5).

y = _____

2. (1 pt)

Find the equation of the straight line tangent to the curve

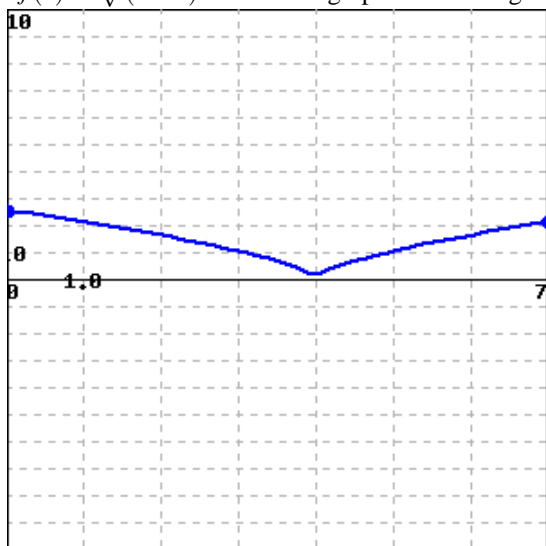
$$f(x) = \frac{1}{-1 - 4x}$$

at the point (-3, f(-3)).

y = _____

3. (1 pt)

Let $f(x) = \sqrt[3]{(x-4)^2}$. Click the graph to see a larger view.



Does the graph of the function have a tangent line of the form $y = mx + b$ at the given points? If not, enter the word **NO** in the answer box, without quotes. If yes, enter the equation of the tangent line.

You may do this problem by using Maple or another computer program to approximate the limit of the relevant difference quotients.

Simplify the numeric parts of your answer; for instance, you must enter -2 instead of $(-8)^{(1/3)}$.

At $x = 1$, the tangent line is

y = _____

At $x = 4$, the tangent line is

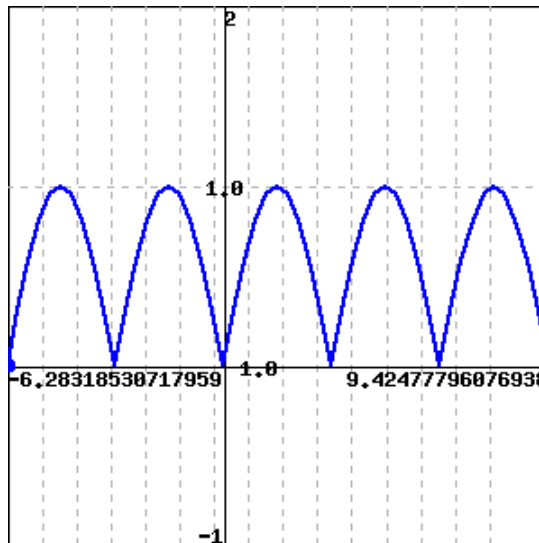
y = _____

At $x = 6$, the tangent line is

y = _____

4. (1 pt)

Let $g(x) = |\sin(x)|$. Click the graph to see a larger view.



What is the equation of the line tangent to g at $x = \frac{\pi}{12}$?

y = _____

You may use Maple here as in the previous problem.

Give the smallest **positive** value of x at which g does **not** have a tangent line.

x = _____

5. (1 pt)

Consider the function $f(x) = x^3 + 3.75x^2 - 78x + 1$. How many horizontal tangent lines does f have? You may use the applet, Maple, or a graphing tool to plot $f(x)$.

6. (1 pt)

Find the slope of the line tangent to the curve

$$f(x) = \frac{1}{4}x^2$$

at the point $(t, f(t))$.

slope = _____

7. (1 pt)

Find the equation of the straight line tangent to the curve $y = x^3 - 64$ at the point (4, 0).

y = _____

8. (1 pt)

Find the equation of the straight line tangent to the curve $y = x^4$ at the point (1, 1).

y = _____

9. (1 pt)

Find the slope of the straight line tangent to the curve $y = x^3 + 4x - 25$ at the point (0, -25).

slope = _____

10. (1 pt)

Find the slope of the straight line tangent to the curve $y = \sqrt{x}$ at the point where $x = 1$.

slope = _____

11. (1 pt)

Let $f(x)$ be the parabola $-x^2 + 4x - 4$. Find the equation of the tangent line at the point $(2, 0)$.

$y =$ _____

12. (1 pt)

Let $f(x)$ be the parabola $-x^2 + 16x - 16$. Find the point (x, y) on f such that the tangent line to f at (x, y) passes through the origin.

$(x, y) = ($ _____, _____)

13. (1 pt)

A kumquat is thrown into the air at a velocity of 75 feet per second. Its height (in feet) after t seconds can be described by the function $f(t) = 75t - 16t^2$. Find the slope of the tangent line to this function at $t = 3$.

slope = _____

Is this the same as the velocity at $t = 3$? (Y/N)

14. (1 pt)

Let $f(x) = ||4x| - 4|$. Find the slope of the tangent line to this function at the following points. If there is no tangent line, enter DNE.

$x = 6$: _____

$x = 1$: _____

$x = 2$: _____

$x = -6$: _____
