

SCORE: ____ / 20 POINTS

The graph of a function f is shown on the right. State the values of the following expressions, if they exist.

SCORE: ____ / 4 POINTS

Write DNE where appropriate.

[a] $\lim_{x \rightarrow 1} f(x)$

0

[b] $f(1)$

DNE

[c] $\lim_{x \rightarrow -1} f(x)$

1

[d] $\lim_{x \rightarrow -3} f(x)$

1

[e] $\lim_{x \rightarrow 3} f(x)$

DNE

[f] $f(-3)$

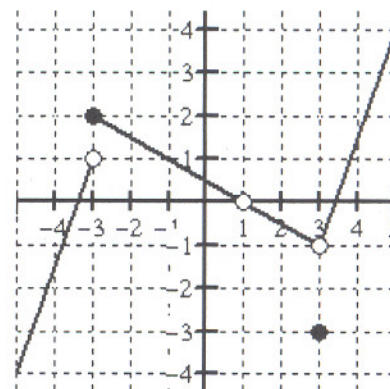
2

[g] $\lim_{x \rightarrow 3} f(x)$

-1

[h] $f(3)$

-3

Some values for a function f are given in the table below.

SCORE: ____ / 3 POINTS

Estimate the slope of the tangent line to $y = f(x)$ at $x = 9$ by averaging the slope of 2 appropriate secant lines.

Show the calculations that lead to your answers.

x	1	3	5	7	9	11
$f(x)$	-2	2	6	4	12	8

$$\frac{12-4}{9-7} = 4$$

$$\frac{8-12}{11-9} = -2$$

$$\frac{4 + (-2)}{2} = 1$$

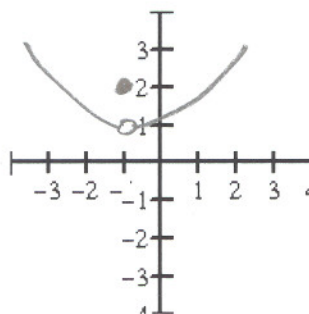
Sketch the graph of a function f such that

SCORE: ___ / 3 POINTS

$f(-1)$ exists,

$\lim_{x \rightarrow -1} f(x)$ exists and

$\lim_{x \rightarrow -1} f(x) \neq f(-1)$.



The position of an object travelling along a straight line is given by $s(t) = t^3 + t$.

SCORE: ___ / 3 POINTS

Find the average velocity of the object for the time period beginning when $t = 2$ and lasting 0.2 second.

Show the calculations that lead to your answers.

$$\frac{s(2.2) - s(2)}{2.2 - 2} = \frac{12.848 - 10}{0.2} = 14.24$$

The point $P(2, 3)$ lies on the curve $y = \sqrt{x^2 + 5}$.

$$\frac{\sqrt{x^2 + 5} - 3}{x - 2}$$

SCORE: ___ / 7 POINTS

(a) If Q is the point $(x, \sqrt{x^2 + 5})$, use your calculator to find the slope of the secant line PQ (correct to three decimal places) for the following values of x :

x	1.5	1.9	1.99	1.999	2.001	2.01	2.1	2.5
slope of secant line	0.615	0.657	0.666	0.667	0.667	0.668	0.676	0.708

(b) Using the results of part (a), guess the value of the slope of the tangent line to the curve at $P(2, 3)$.

$$0.\overline{6} \quad \text{or} \quad \frac{2}{3}$$

(c) Using the slope from part (b), find an equation of the tangent line to the curve at $P(2, 3)$.

$$y - 3 = \frac{2}{3}(x - 2)$$

$$\text{or} \quad y = 3 + \frac{2}{3}(x - 2) \quad \text{or} \quad y = \frac{2}{3}x + \frac{5}{3}$$