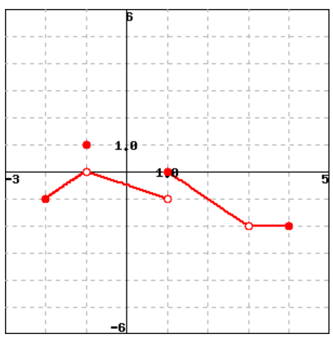
1. (1 point) Let F be the function whose graph is shown below. Evaluate each of the following expressions.

(If a limit does not exist or is undefined, enter "DNE".)

1. $\lim_{x\to -1^-} F(x) =$ ___
2. $\lim_{x\to -1^+} F(x) =$ ___
3. $\lim_{x\to -1} F(x) =$ ___
4. $F(-1) =$ ___
5. $\lim_{x\to 1^-} F(x) =$ ___
6. $\lim_{x\to 1^+} F(x) =$ ___
7. $\lim_{x\to 1} F(x) =$ ___
8. $\lim_{x\to 3} F(x) =$ ___
9. $F(3) =$ ___



The graph of $y = F(x)$.

Correct Answers:

- 0
- 0
- 0
- 1
- -1
- 0
- DNE
- -2
- DNE

2. (1 point)

The following limit represents the derivative of some function f at some number a.

$$\lim_{h\to 0} \frac{(1+h)^{10}-1}{h}$$

What are f and a?

$f(x) =$ ____________

$a =$ ____________

Correct Answers:

- x^10
- 1

3. (1 point) Find the value of the constant a that makes the following function continuous on $(-\infty,\infty)$.

$$f(x) = \begin{cases} \dfrac{5x^3+29x^2+4x+60}{x+6} & \text{if } x < -6 \\ 3x^2-6x+a & \text{if } x \geq -6 \end{cases}$$

$a =$ ____________

Correct Answers:

- 52

4. (1 point) Find the value of the constant c that makes the following function continuous on $(-\infty,\infty)$.

$$f(x) = \begin{cases} x^2-c & \text{if } -\infty < x < 6 \\ cx+9 & \text{if } x \geq 6 \end{cases}$$

$c =$ ____________

Correct Answers:

- 3.85714

5. (1 point) A function f is said to have a **removable** discontinuity at a if:

1. f is either not defined or not continuous at a.

2. $f(a)$ could either be defined or redefined so that the new function is continuous at a.

Let $f(x) = \frac{2x^2+5x-7}{x-1}$.

Show that f has a removable discontinuity at 1 and determine the value for $f(1)$ that would make f continuous at 1.

Need to redefine $f(1) =$______.

Correct Answers:

- 9

6. (1 point)

Find the equation of the tangent line to the curve at the given point.

$y = 1+2x-x^3$, $(1,2)$

$y =$ ____________

Correct Answers:

- -x+3

7. (1 point)

If $f(x) = x^3 - 5x + 1$, find $f'(1)$

$f'(1) =$ ______

Use it to find an equation of the tangent line to the parabola $y = x^3 - 5x + 1$ at the point (1,-3).

$y =$ ______

Correct Answers:

- `-2`
- `-2 x - 1`

8. (1 point)

This limit

$\lim_{h \to 0} \frac{\sqrt[4]{16+h}-2}{h}$

represents the derivative of some function f at some number a. State this f and a.

$a =$ ______ $f =$ ______

Correct Answers:

- `16`
- `(x)^.25`

9. (1 point) Let

$$f(x) = -3x^3 - 9x + 5$$

Use the limit definition of the derivative to calculate the derivative of f:

$f'(x) =$ ______.

Use the same formula from above to calculate the derivative of this new function (i.e. the second derivative of f):

$f''(x) =$ ______.

Correct Answers:

- `-9*x^2  - 9`
- `-18*x`

10. (1 point) Let $f(x) = \sqrt{20 - x}$

The slope of the tangent line to the graph of $f(x)$ at the point $(4,4)$ is ______.

The equation of the tangent line to the graph of $f(x)$ at $(4,4)$ is $y = mx + b$ for

$m =$ ______

and

$b =$ ______.

Hint: the slope at $x = 4$ is given by

$$m = \lim_{h \to 0} \frac{f(4+h) - f(4)}{h}$$

Correct Answers:

- `-0.125`
- `-0.125`
- `4.5`