1. (1 point)

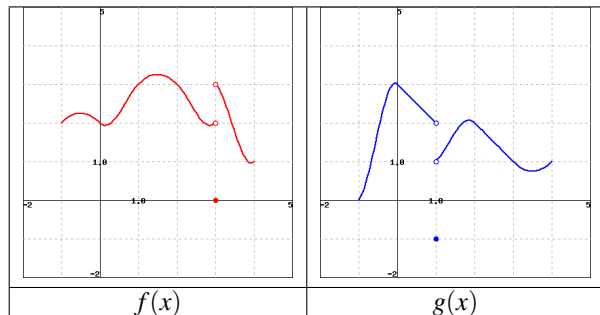| $f(x)$ | $g(x)$ |

The graphs of $f(x)$ and $g(x)$ are given above. Use them to evaluate each quantity below. Write *DNE* if the limit or value does not exist (or if it's infinity).

___1. $\lim\limits_{x\to3^+}[f(x)+g(x)]$
___2. $f(3)+g(3)$
___3. $\lim\limits_{x\to3^+}[f(x)g(x)]$
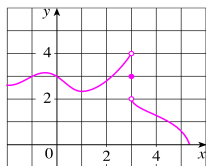___4. $\lim\limits_{x\to3^+}[f(g(x))]$

Correct Answers:

- 4
- 1
- 3
- 3

2. (1 point)
For the function f whose graph is given, state the value of the given quantity, if it exists. If it does not exist, enter "n" below.
(a) $\lim\limits_{x\to0} f(x)$
(b) $\lim\limits_{x\to3^-} f(x)$
(c) $\lim\limits_{x\to3^+} f(x)$
(d) $\lim\limits_{x\to3} f(x)$
(e) $f(3)$

(a) ____
(b) ____
(c) ____
(d) ____
(e) ____

Correct Answers:

- 3
- 4
- 2
- n
- 3

3. (1 point) The point $P(9,5)$ lies on the curve $y = \sqrt{x}+2$. Let Q be the point $(x, \sqrt{x}+2)$.

a.) Find the slope of the secant line PQ for the following values of x. (Answers here should be correct to at least 6 places after the decimal point.)

If $x = 9.1$, the slope of PQ is: _____
If $x = 9.01$, the slope of PQ is: _____
If $x = 8.9$, the slope of PQ is: _____
If $x = 8.99$, the slope of PQ is: _____

b.) Based on the above results, estimate the slope of the tangent line to the curve at $P(9,5)$.

Answer: _____
Correct Answers:

- 1/(3 + 3.01662062579967)
- 1/(3 + 3.00166620396073)
- 1/(3 + 2.98328677803526)
- 1/(3 + 2.99833287011299)
- 1/(2* 3)

4. (1 point)
A function is said to have a **horizontal asymptote** if either the limit at infinity exists or the limit at negative infinity exists.
Show that each of the following functions has a horizontal asymptote by calculating the given limit.

$\lim\limits_{x\to\infty} 10+\dfrac{9x}{x^2-10x+3}=$ ____

$\lim\limits_{x\to-\infty} \dfrac{10-5x}{11+x}+\dfrac{11x^2+7}{(12x-15)^2}=$ ____

$\lim\limits_{x\to-\infty} \dfrac{10x+3}{x-14}\cdot\dfrac{7x-10}{-x-7}=$ ____

$\lim\limits_{x\to\infty} \sqrt{x^2+5x-7}-x=$ ____

$\lim\limits_{x\to-\infty} \sqrt{x^2+5x-7}+x=$ ____

Correct Answers:

- 10
- -4.92361111111111
- -70

- 2.5
- -2.5

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5. (1 point)

Evaluate the limit, if it exists. If not, enter "n" below.

$$\lim_{x \to 2} \frac{x^2 + x - 6}{x - 2}$$

Correct Answers:

- 5

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6. (1 point)

Evaluate the following limit. If the answer is positive infinite, type "I"; if negative infinite, type "N"; and if it does not exist, type "D".

$$\lim_{x \to \infty} \sqrt{\frac{12x^3 - 5x + 9}{1 + 7x^2 + 3x^3}}$$

Correct Answers:

- 2

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7. (1 point) Let $f(x) = 6x^4 + 4$.

(a) Use the limit process to find the slope of the line tangent to the graph of f at $x = 2$.

Slope at $x = 2$: _____

(b) Find an equation of the line tangent to the graph of f at $x = 2$.

Tangent line: $y =$ _____

Correct Answers:

- 192
- 192*(x-2)+100

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8. (1 point) Evaluate the limit :

$$\lim_{x \to 5^+} \frac{|x - 5|}{x - 5}.$$

If the limit does not exist, enter **DNE**.

Limit = _____

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9. (1 point)

Let $f(x) = \begin{cases} \sqrt{-5 - x} + 4, & \text{if } x < -6 \\ 4, & \text{if } x = -6 \\ 2x + 17, & \text{if } x > -6 \end{cases}$

Calculate the following limits. Enter **DNE** if the limit does not exist.

$$\lim_{x \to -6^-} f(x) = \text{_____}$$

$$\lim_{x \to -6^+} f(x) = \text{_____}$$

$$\lim_{x \to -6} f(x) = \text{_____}$$

Correct Answers:

- 5
- 5
- 5

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10. (1 point)

Evaluate the following limits. If needed, enter INF for ∞ and MINF for $-\infty$.

(a)

$$\lim_{x \to \infty} \left(\sqrt{x^2 + 6x + 1} - x \right) =$$

_____

(b)

$$\lim_{x \to -\infty} \left(\sqrt{x^2 + 6x + 1} - x \right) =$$

_____

Correct Answers:

- 3
- INF