Lecture Two Practice

Practice problems for Lecture Two

Abstract. *Practice problems for Lecture Two Content*

Problem. 1 : Determine if the limit approaches a finite number, ∞, $-\infty$, or does not exist. (If the limit does not exist, write DNE)

$$\lim_{x \to 10} \frac{3\,x^2 - 42\,x + 120}{x - 10} = \boxed{}\,?$$

Problem. 2 : Determine if the limit approaches a finite number, ∞, $-\infty$, or does not exist. (If the limit does not exist, write DNE)

$$\lim_{x \to 4} \frac{2\,x - 8}{x^2 - 10\,x + 24} = \boxed{}\,?$$

Problem. 3 : Determine if the limit approaches a finite number, ∞, $-\infty$, or does not exist. (If the limit does not exist, write DNE)

$$\lim_{x \to -8} \frac{3\,x^2 + 9\,x - 120}{x - 5} = \boxed{}\,?$$

Problem. 4 : Determine if the limit approaches a finite number, ∞, $-\infty$, or does not exist. (If the limit does not exist, write DNE)

$$\lim_{x \to -9} \frac{2\,x + 20}{x^2 + 19\,x + 90} = \boxed{}\ ?$$

Problem. 5 : Determine if the limit approaches a finite number, ∞, $-\infty$, or does not exist. (If the limit does not exist, write DNE)

$$\lim_{x \to 5} \frac{x^2 - 7\,x + 10}{x^2 - 25} = \boxed{}\ ?$$

Problem. 6 : Determine if the limit approaches a finite number, ∞, $-\infty$, or does not exist. (If the limit does not exist, write DNE)

$$\lim_{x \to -2} \frac{-3\,x^3 - 24}{x^2 + x - 2} = \boxed{}\ ?$$

Problem. 7 : Calculate the following limit:

$$\lim_{x \to -\sqrt{3}} \frac{8\left(x^4 - 9\right)}{x^2 - 3} = \boxed{}\ ?$$

Problem. 8 : Compute the following limit:

$$\lim_{x \to -8} -\frac{4\left(x + 5\right)^2 + 1}{\frac{1}{3\,x+2} + 2} = \boxed{}\ ?$$

Problem. 9 : Evaluate the limit using the appropriate Limit Law(s). (If an answer does not exist, enter DNE.)

$$\lim_{x \to 0} -10\,x^2 - 6\,x = \boxed{}\ ?$$

Problem. 10 : Evaluate the limit using the appropriate Limit Law(s). (If an answer does not exist, enter DNE.)

$$\lim_{x\to 1} \frac{x^3 + 13\,x^2 + 24\,x - 108}{x^2 + 12\,x + 35} = \boxed{}\ ?$$

Problem. 11 : Evaluate the limit using the appropriate Limit Law(s). (If an answer does not exist, enter DNE.)

$$\lim_{x\to 1} \sqrt{-5\,x^2 + 5\,x + 8} = \boxed{}\ ?$$

Problem. 12 : Evaluate the limit using the appropriate Limit Law(s). (If an answer does not exist, enter DNE.)

$$\lim_{x\to -1} -\left(9\,x^2 - 5\,x - 4\right)\left(x^{\frac{1}{3}} - 2\right) = \boxed{}\ ?$$

Problem. 13 : Evaluate the limit using the appropriate Limit Law(s). (If an answer does not exist, enter DNE.)

$$\lim_{x\to 5} \frac{-2\,x + 10}{|x - 5|} = \boxed{}\ ?$$

Problem. 14 : Evaluate the limit using the appropriate Limit Law(s). (If an answer does not exist, enter DNE.)

$$\lim_{x\to -2} \frac{-6\,|x| + 12}{3\,x + 6} = \boxed{}\ ?$$

Problem. 15 : If you know that $\lim_{x\to -1} f(x) = -3$ and $\lim_{x\to 0} g(x) = 3$, then evaluate the following limit:

$$\lim_{x\to 0} f(x-1)g(x) = \boxed{}\ ?$$

Problem. 16 : If you know that $\lim_{x\to 4} f(x) = 3$ and $\lim_{x\to 0} g(x) = -5$, then evaluate the following limit:

$$\lim_{x\to 0} f(x+4) + g(x) = \boxed{}\ ?$$

Problem. 17 : If you know that $\lim_{x\to -4} f(x) = -5$ and $\lim_{x\to 0} g(x) = -3$, then evaluate the following limits:

$$\lim_{x\to 0} f(x-4)g(x) = \boxed{}\ ?$$

$$\lim_{x\to 0} f(x-4) + g(x) = \boxed{}\ ?$$

$$\lim_{x\to 0} g(x) - f(x-4) = \boxed{}\ ?$$

$$\lim_{x\to -4} \frac{f(x)}{g(x+4)} = \boxed{}\ ?$$

Problem. 18 : The limit as x approaches -3 of $f(x) = (x+3)\cos\left(-\frac{20}{x+3}\right)$ is 0. What is the reason why this is true?

The statement is in fact false: $\lim_{x\to -3}(x+3)\cos\left(-\frac{20}{x+3}\right) \neq 0$.
The cosine factor decreases to 0 faster than the polynomial.
The cosine factor is bounded between -1 and 1, so the polynomial forces the function to 0.
The cosine factor directly cancels out the polynomial factor.

? Check work

What is the name of the theorem that applies to this problem?

The [ ] ? Theorem

Problem. 19 : Calculate the following limit. (If the limit does not exist, enter DNE.)

$$\lim_{x\to -1}\frac{\sqrt{x^2+8}-3}{x+1} = \boxed{\quad}\ ?\ .$$