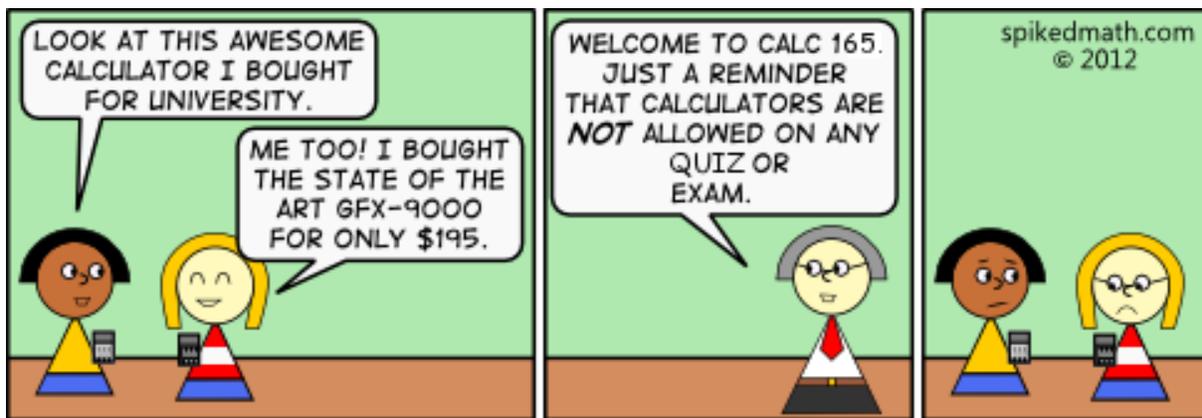


Answer as many problems as you can. Show your work. An answer with no explanation will receive no credit.

Good luck!

Problem 1	Problem 2	Problem 3	Problem 4	Problem 5
/10	/10	/10	/10	/10

Total score
/50



Actually, calculators are allowed but only the most basic ones. If your calculator can evaluate trigonometric functions, it is NOT allowed. If it can be used as a communication device, it is NOT allowed either.

1: Let f be a function with $f(0) = 3$. The average rate of change of f on $[0, 2]$ is 4 and the average rate of change of f on $[2, 5]$ is -2 . What is $f(5)$?

2: Let f be a function on $(0, \infty)$ defined as

$$f(x) = \begin{cases} \frac{\sqrt{x}-1}{x-1} & 0 < x < 1 \\ ax & x \geq 1 \end{cases}$$

for some $a \in \mathbb{R}$. Find a such that f is a continuous function on $(0, \infty)$.

3: Compute the following limit using the squeeze/sandwich/2 cops theorem:

$$\lim_{x \rightarrow \infty} e^{-x} \cos x$$

4: Once you know $\lim_{x \rightarrow a^+} f(x)$ and $\lim_{x \rightarrow a^-} f(x)$ at an interior point of the domain of f , what do you know about $\lim_{x \rightarrow a} f(x)$?

Choose ONE answer below. No further explanation is necessary.

- A. If the side limits are equal to each other, then $\lim_{x \rightarrow a} f(x)$ exists and it equals the common value of the side limits. If the side limits are not equal to each other, then $\lim_{x \rightarrow a} f(x)$ equals to the larger limit.
- B. If the side limits are equal to each other, then $\lim_{x \rightarrow a} f(x)$ exists and it equals the common value of the side limits. If the side limits are not equal to each other, then $\lim_{x \rightarrow a} f(x)$ equals to the smaller limit.
- C. If the side limits are equal to each other, then $\lim_{x \rightarrow a} f(x)$ exists and it equals the common value of the side limits. If the side limits are not equal to each other, then $\lim_{x \rightarrow a} f(x)$ equals to the average of the one-sided limits.
- D. If the side limits are equal to each other, then $\lim_{x \rightarrow a} f(x)$ exists and it equals the common value of the side limits. If the side limits are not equal to each other, then $\lim_{x \rightarrow a} f(x)$ does not exist.
- E. Nothing can be said about $\lim_{x \rightarrow a} f(x)$.
- F. I admit I have not idea. [You will get 3 points for selecting this answer. Notice that a random guess from A to E gives 2 points on average.]

5: Compute the following limit:

$$\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 2} - (x + 2)}{\tan 3x}$$