Multiple choice questions - Functions, limits and continuity

Year: University Year 1 · 10

Question 1 $\lim_{x\to 3} \frac{x^2-9}{x-3} =$

- **A.** 0
- **B.** 3
- **C.** 6
- **D.** does not exist

Question 2 $\lim_{x\to 0} \frac{\sin x}{x} =$

- **A.** 0
- **B.** 1
- **C.** ∞
- **D.** does not exist

Question 3 In the ε-δ definition, δ usually depends on

- **A.** ε (and maybe a)
- **B.** nothing
- **C.** x only
- **D.** L only

Question 4 $\lim_{x\to\infty} \frac{2x+1}{5x-3} =$

- **A.** $2/5$
- **B.** $-1/3$
- **C.** 0
- **D.** ∞

Question 5 $|x|/x$ at $x = 0$ has

- **A.** a removable discontinuity
- **B.** a jump discontinuity
- **C.** an essential discontinuity
- **D.** no discontinuity

Question 6 The IVT requires f to be

- **A.** differentiable on $[a, b]$
- **B.** continuous on $[a, b]$

- ◯ **C.** increasing
- ◯ **D.** bounded only

Question 7 $\lim_{x\to 0} x\sin(1/x) =$

- ◯ **A.** 1
- ◯ **B.** does not exist
- ◯ **C.** 0
- ◯ **D.** ∞

Question 8 If $f(1) = -2$, $f(3) = 4$ and f is continuous on $[1, 3]$, then

- ◯ **A.** $f(c) = 0$ for some c
- ◯ **B.** f is increasing
- ◯ **C.** $f(2) = 1$
- ◯ **D.** f is bounded by 4

Question 9 $\lim_{x\to 0} \frac{1-\cos x}{x^2} =$

- ◯ **A.** 0
- ◯ **B.** 1
- ◯ **C.** $1/2$
- ◯ **D.** 2

Question 10 A limit at a exists if and only if

- ◯ **A.** f(a) is defined
- ◯ **B.** both one-sided limits exist and are equal
- ◯ **C.** f is continuous
- ◯ **D.** f is monotonic

Answer grid - Functions, limits and continuity

Year: University Year 1

Question	Answer	Explanation
1	**C**	$x+3 \to 6$.
2	**B**	Standard limit.
3	**A**	δ is chosen after ε.
4	**A**	Ratio of leading coefficients.
5	**B**	One-sided limits are ± 1.
6	**B**	Continuity on the closed interval.
7	**C**	Squeeze between $-\lvert x\rvert$ and $\lvert x\rvert$.
8	**A**	0 lies between -2 and 4.
9	**C**	Standard limit.
10	**B**	Definition of two-sided limit.