Math 101

Quiz 3&4 (chapter 2)

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1. An equation of the tangent line to the curve $y = \dfrac{1}{x^3}$ when $x = -1$ is given by

(a) $y = -3x - 2$

(b) $y = -2x - 3$

(c) $y = -\dfrac{1}{3}x - \dfrac{4}{3}$

(d) $y = \dfrac{1}{3}x + 1$

(e) $y = -3x - 4$

2. If $f(x) = \dfrac{x + |x|}{|x|}$, then which one of the following statements is **TRUE** ?

(a) $\lim\limits_{x \to 0^+} f'(x) = \infty$

(b) $\lim\limits_{x \to \infty} f'(x) = 1$

(c) $\lim\limits_{x \to -\infty} f'(x) = 1$

(d) $\lim\limits_{x \to 0^-} f'(x) = 0$

(e) $\lim\limits_{x \to 0} f'(x) = \pm 1$

3. Which one of the following statements is **TRUE** about the continuity of the function?

$$f(x) = \begin{cases} \dfrac{x^3-1}{x^2+3x-4}, & x \neq 1, -4 \\ 4, & x = 1 \\ 5, & x = -4 \end{cases}$$

(a) f has an infinite discontinuity at $x = 1$

(b) f has a jump discontinuity at $x = 1$

(c) f has a removable discontinuity at $x = 1$

(d) f is continuous at $x = -4$

(e) f has a removable discontinuity at $x = -4$

4. If the function

$$f(x) = \begin{cases} \dfrac{x+b}{b+1} & x < 0 \\ x^2 + b & x \geq 0 \end{cases}$$

is continuous everywhere, then $f(-1) =$

(a) 0

(b) -1

(c) 2

(d) 4

(e) -3

5. Let $f(x) = \sqrt{1-3x}$. The **greatest possible** value of $\delta > 0$ for which $\lim_{x \to -1} f(x) = 2$, when $\varepsilon = \dfrac{1}{2}$ is

(a) $\dfrac{7}{12}$

(b) $\dfrac{9}{12}$

(c) $\dfrac{5}{12}$

(d) $\dfrac{5}{2}$

(e) $\dfrac{3}{2}$

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

(a) 0

(b) 1

(c) -2

(d) 2

(e) -1

7. The function $f(x) = \begin{cases} x^2 + b\,x & \text{if} \quad x \leq 1 \\ a\,x + b & \text{if} \quad x > 1 \end{cases}$
is differentiable everywhere. Then $b =$

(a) 1

(b) 2

(c) -2

(d) -1

(e) 0

8. Where is $f(x) = \ln(1 - \sqrt{x})$ **continuous**?

(a) $(0, \infty)$

(b) $(0, 1)$

(c) $[0, 1)$

(d) $(1, \infty)$

(e) $(0, \infty)$

9. $\lim\limits_{x \to -1^+} \dfrac{x}{\sqrt{x+1}} =$

(a) ∞

(b) $-\infty$

(c) 0

(d) 1

(e) 2

10. If $\lim\limits_{x \to 3} \dfrac{f(x) - 4}{x - 3} = 5$, then $\lim\limits_{x \to 3} x\, f(x) =$

(a) 12

(b) 15

(c) 0

(d) 5

(e) -4