MATH 140 First Exam Practice Test

Problem 1. What is the domain of the function $f(x) = \dfrac{1}{\sqrt{8 - x^2}}$?

A. $0 < x < \sqrt{8}$

B. $x > \sqrt{8}$ or $x < -\sqrt{8}$

C. $-\sqrt{8} < x < \sqrt{8}$

D. $-\sqrt{8} < x < 0$

E. All x but $\pm\sqrt{8}$

Problem 2. If $\lim\limits_{x \to 0^-} f(x) = -2$ and f is continuous at $x = 0$, we can say that $\lim\limits_{x \to 5} f(|x - 5|) + 1$ is

A. -4

B. 0

C. 3

D. -1

E. insufficient information; cannot be determined

Problem 3. What is $\lim\limits_{t \to 0^+} \dfrac{t - |t|}{t + |t|}$?

A. 0

B. $1/2$

C. $+\infty$

D. 1

E. does not exist

Problem 4. Let C be a constant and $f(x) = \begin{cases} Cx^2 & x \geq 0 \\ -Cx^2 & x < 0. \end{cases}$ If the second derivative $f''(0)$ exists, then C must be

A. 1

B. -1

C. $1/2$

D. $-1/2$

E. 0

Problem 5. What, if any, are the points of discontinuity of the function

$$f(x) = \begin{cases} \dfrac{\sin(2x)}{x} & x < 0 \\ 2 - x & 0 \le x \le 1 \\ \dfrac{1}{|x - 2|} & x > 1, x \ne 2 \end{cases}$$

A. none

B. $x = 0$ only

C. $x = 1$ only

D. $x = 2$ only

E. $x = 0$ and $x = 2$

Problem 6. What is $\lim\limits_{x \to 1} \dfrac{\sin(2x - 2)}{x^2 - 1}$?

A. 1

B. 2

C. 0

D. $+\infty$

E. does not exist

Problem 7. If $g(w) = \cos\left(\dfrac{\pi}{\sqrt{w} + 1}\right)$, then $g'(1) =$

A. 0

B. $\pi/8$

C. $-\pi/8$

D. $\pi/4$

E. $-\pi/4$.

Problem 8. A particle moves on the line so that its position at time $t \ge 0$ is given by $s(t) = \sqrt{2t^2 + 3} + t$. What is $\lim_{t \to +\infty} v(t)$?

A. $\sqrt{2}$

B. $+\infty$

C. 0

D. $\sqrt{2} + 1$

E. does not exist

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Problem 9. Let $f(x) = \sin(2x)$. Which horizontal line intersects the graph of f somewhere in the interval $[0, \frac{\pi}{2}]$ at an angle $\pi/3$?

A. $y = 1/2$

B. $y = -1/2$

C. $y = 1/3$

D. $y = -1/3$

E. $y = 0$

Problem 10. Find the output to the following Maple statement:

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> limit((x^3+x^2+5x+5)/(x^2-1),x=-1);
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A. -3

B. 3

C. $1/3$

D. $-1/3$

E. $1/6$

Problem 11. If $g(0) = 1$, $g'(0) = 3$, $f(1) = 9$, $f'(1) = 2$, the derivative of the function $\sqrt{(f \circ g)(x)}$ at $x = 0$ is

A. $1/6$

B. $-1/6$

C. $-1/2$

D. -1

E. 1

Problem 12. The function $f(x) = x^3 + 3x - 1$ has a root

A. between -1 and 0

B. between 0 and 1

C. between 1 and 2

D. between 2 and 3

E. between 3 and 4