

► **Print your name legibly as it appears on the class rolls:**

Last _____ First _____

ID Number: 1 0 0 0 _ _ _ _ _

► **Check the appropriate section:**

- 001 – Dr. Krueger
- 004 – Dr. Shan
- 007 – Dr. Jorgensen
- 010 – Dr. Epperson
- 013 – Mr. Clanton

► **Fill in your scantron exactly as below:**

NAME	Last, first (EXACTLY AS YOU WROTE ABOVE)		
SUBJECT	1426- YOUR SECTION #	TEST NO.	1A
DATE	PERIOD		

► **Turn cell phones off and put them out of sight. Turn off all beepers and alarms.**

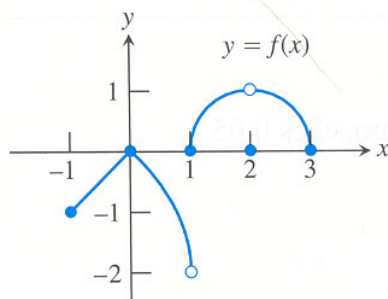
► **Do not write below this line**

Part I total (48 points)	Your score 4 × _____ = _____
13 (10 points)	
14 (10 points)	
15 (10 points)	
16 (12 points)	
17 (10 points)	
Part II total (52 points)	
Midterm 1 Total (100 points)	

The square brackets following an exam question number refer to a section/problem number in the text. Problem numbers preceded by the symbol ~ are modeled on that problem from the text, but not identical to it. Problem numbers without the symbol are identical to or very close to the problem from the text.

INSTRUCTIONS FOR PART I: Write your answers for these questions on a scantron (form 882-E or 882-ES) and mark only one answer per question. **Scantrons will not be returned so mark your answers on your exam paper also; however, your grade will be determined solely by what you mark on your scantron.** Each of the questions in this part counts 4 points, for a total possible score of 48 points. You may use an approved calculator. You may write on this exam or request scratch paper if needed.

- [2.1/30] Find the average rate of change of the function $g(x) = x^2$ over the interval $[-2, 0]$.
 (a) -2 (b) 2 (c) 0 (d) $2x$ (e) -4
- [2.1/4] The graph of a function $y = f(x)$ is given below. Which of the following statements are TRUE?



- $\lim_{x \rightarrow 2} f(x)$ does not exist
- $\lim_{x \rightarrow 2} f(x) = 2$
- $\lim_{x \rightarrow 1} f(x)$ does not exist
- $\lim_{x \rightarrow x_0} f(x)$ exists at every point x_0 in $(-1, 1)$
- $\lim_{x \rightarrow x_0} f(x)$ exists at every point x_0 in $(1, 3)$

- (a) I & IV only (b) I & III only (c) III & IV only
 (d) III, IV, & V only (e) none
- [2.2/49] If $\sqrt{5-2x^2} \leq f(x) \leq \sqrt{5-x^2}$ for $-1 \leq x \leq 1$, find $\lim_{x \rightarrow 0} f(x)$.
 (a) $-\sqrt{5}$ (b) $\pm\sqrt{5}$ (c) $\sqrt{5}$ (d) $f(0)$
 (e) not enough information is given

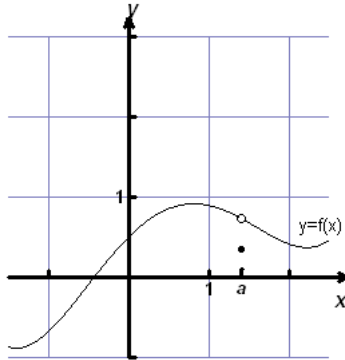
- [2.2/38] Suppose $\lim_{x \rightarrow 1} h(x) = 5$, $\lim_{x \rightarrow 1} p(x) = 1$, and $\lim_{x \rightarrow 1} r(x) = 2$. Find $\lim_{x \rightarrow 1} \frac{\sqrt{5h(x)}}{p(x)[4-r(x)]}$.
 (a) $\frac{5}{2}$ (b) $-\frac{5}{2}$ (c) $\frac{\sqrt{5}}{2}$ (d) $-\frac{\sqrt{5}}{2}$ (e) does not exist

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5. [2.4/16] Find the limit: $\lim_{h \rightarrow 0^-} \frac{\sqrt{6} - \sqrt{5h^2 + 11h + 6}}{h}$.
- (a) $\frac{11}{2\sqrt{6}}$ (b) $-\frac{11}{2\sqrt{6}}$ (c) $\frac{11}{\sqrt{6}}$ (d) $\sqrt{6}$ (e) does not exist
6. [2.4/39] Find the limit: $\lim_{x \rightarrow \infty} \frac{1}{\left(2 + \frac{1}{x}\right)}$.
- (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) 1 (d) 2 (e) does not exist
7. [2.5/~40] A function f is defined for all real numbers. If $f(1) = 2$, $\lim_{x \rightarrow 1^-} f(x) = -2$, $\lim_{x \rightarrow 1^+} f(x) = 2$, $\lim_{x \rightarrow 4^-} f(x) = \infty$, $\lim_{x \rightarrow 4^+} f(x) = \infty$, $\lim_{x \rightarrow -\infty} f(x) = 0$, and $\lim_{x \rightarrow +\infty} f(x) = -5$, which of the following statements are TRUE?
- I. $\lim_{x \rightarrow 1} f(x) = 2$ II. f is left-continuous at $x = 1$
 III. $x = 4$ is a vertical asymptote IV. $y = -5$ is a horizontal asymptote
- (a) I & II only (b) I & III only (c) I, II, & III only
 (d) I, II, III, & IV (e) III & IV only
8. [2.5/19] Find the limit: $\lim_{x \rightarrow 0} \left(\frac{1}{x^3} - \frac{2}{x^4} \right)$.
- (a) ∞ (b) $-\infty$ (c) 0 (d) $\frac{1}{2}$ (e) -1
9. [2.6] Which of the following functions are continuous for all real numbers?
- I. $f(x) = |x|$
 II. $f(x) = \tan x$
 III. $f(x) = 3x^2 + x - 7$
- (a) I only (b) II only (c) III only (d) I & III only
 (e) I & II only

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10. [2.6] The graph of a function f is shown below. Which of the following statements about f is FALSE?



- (a) $\lim_{x \rightarrow a} f(x)$ exists
 (b) $\lim_{x \rightarrow a^-} f(x)$ exists
 (c) f is continuous at $x = a$
 (d) $\lim_{x \rightarrow a^+} f(x)$ exists
 (e) $f(a)$ exists

11. [2.7/16] Find the slope of the tangent line to the graph of $h(t) = t^2 + 3t$ at the point $(1, 4)$.

- (a) $3t + 2$ (b) 11 (c) 19 (d) 28 (e) 5

12. [2.7] The tangent line to the curve $y = f(x)$ at the point $(-1, 1)$ is $y = 2x + 3$. What is the derivative of f at $x = -1$?

- (a) 2 (b) $2x$ (c) 3 (d) $2x + 3$
 (e) not enough information is given

INSTRUCTIONS FOR PART II: For these questions, you must write down **all** steps in your solutions. Write legibly and carefully label any graphs or pictures. **Draw a box around your final answer.** Partial credit will be given for those parts of your solution that are correct. The total value of the questions in this section is 52 points.

13. **(10 pts)** [2.2/34] Use algebraic techniques (that means a table of values and

L'Hôpital's rule cannot be used) to find the limit: $\lim_{x \rightarrow -2} \frac{x+2}{\sqrt{x^2+5}-3}$.

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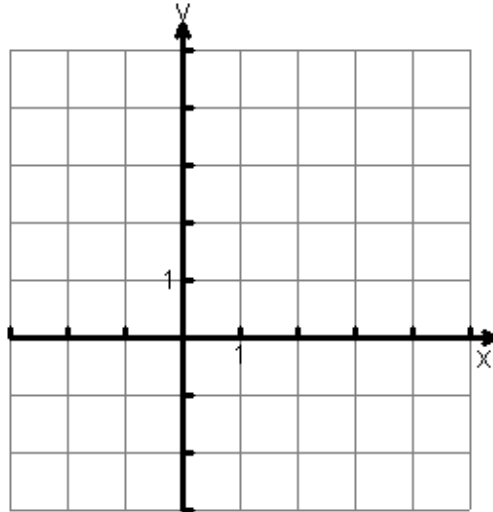
14. **(10 pts)** [2.4/25] Find the limit: $\lim_{x \rightarrow 0} \frac{\tan 2x}{x}$.

15. **(10 pts)** [2.5/~21] Find all the vertical and horizontal asymptotes to the graph of

$$f(x) = \frac{x^2 - 3x + 2}{x^3 - 2x^2}.$$

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16. **(12 pts)** [2.6] Sketch the graph of one function f with all the following properties:
- (i) the domain of f is all real numbers
 - (ii) $\lim_{x \rightarrow 1} f(x) = 3$, $\lim_{x \rightarrow -2^-} f(x) = 3$, $\lim_{x \rightarrow -2^+} f(x) = -2$
 - (iii) f is not continuous at $x = 1$; (iv) $f(-2) = 2$ and $f(3) = 1$
 - (v) $f(4) = -1$ and $\lim_{x \rightarrow 4} f(x) = -1$; (vi) $f(x) \neq 0$ for x in the interval $[3, 4]$



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17. **(10 pts)** [2.7/17] Using techniques from Section 2.7, find the slope of the tangent line to the graph of $f(x) = \sqrt{x}$ at the point $(4, 2)$. Write an equation of the tangent line at this point.

END OF EXAM

If additional sheets of paper are to be graded, ask proctor about attaching them to the exam. Have you shown all work in Part II? Fill in your scantron form as instructed on the front page. Write name & indicate course section on the front page.