The exam will be identical in format to this review. Only the actual values and order of the questions will vary. **Calculators are NOT permitted this exam.**

Free-Response Directions: You must show all work in order to receive full credit.
(43 points total—Specific problem values are listed in parentheses after each problem.)

#20-25: Find each limit algebraically. If the limit does not exist, explain why.

20. $\lim\limits_{x \to -3} \dfrac{\sqrt{x+7} - 2}{x+3}$ *(6 points)*

23. $\lim\limits_{x \to -3} (2x + 5)$ *(2 points)*

21. $\lim\limits_{x \to -1} \dfrac{x^2 - 3x - 4}{x^2 - 1}$ *(5 points)*

24. $\lim\limits_{x \to 2} \dfrac{x^3 - 8}{x - 2}$ *(5 points)*

22. $\lim\limits_{x \to 0} \dfrac{1 - \cos x}{\sin x}$ *(6 points)*

$$f(x) = \begin{cases} 4x - 7, & x < 0 \\ x^2 - 3x + 6, & 0 \le x \le 1 \\ x^3 + 3, & 1 < x < 2 \\ 5x - 1, & x \ge 2 \end{cases}$$

25.   *(11 points)*

A. $\lim\limits_{x \to -1} f(x) =$

D. $\lim\limits_{x \to 2} f(x) =$

B. $\lim\limits_{x \to 0} f(x) =$
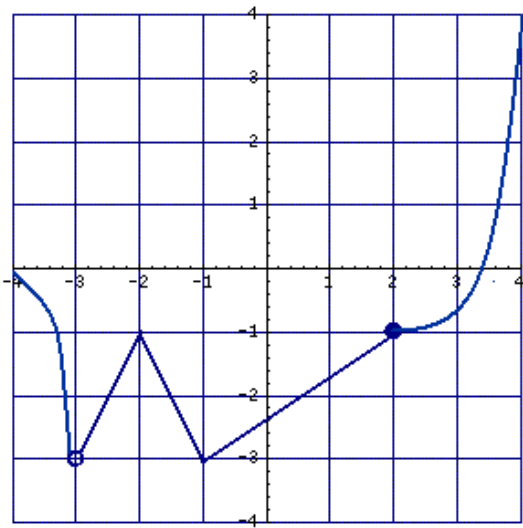
E. $\lim\limits_{x \to 3} f(x) =$

C. $\lim\limits_{x \to 1} f(x) =$

#26: Find the limit below for the function: f(x) = x² – 2x + 1. If the limit does not exist, explain why the limit does not exist. *(8 points)*

$$\lim\limits_{\Delta x \to 0} \dfrac{f(x + \Delta x) - f(x)}{\Delta x}$$

Multiple-Choice Questions: (3 points each = 57 points)

1	Write the limit of g(x) as x approaches c from the left.

A. $\lim\limits_{x \to c} g(x)$

B. $\lim\limits_{c \to x} g(x)$

C. $\lim\limits_{x \to c+} g(x)$

D. $\lim\limits_{x \to c-} g(x)$

E. None of the above

2

$$\lim\limits_{x \to -4+} \frac{x^2 + 5x + 4}{x + 4} =$$

A. Does not exist

B. -3

C. -4

D. 0

E. None of the above

3 A function is graphed below. What is the limit as you approach -2 from the left?

A. -1

B. Does not exist

C. -2

D. 0

E. None of the above

4	$g(x) = \begin{cases} -5x + 4 \; ; x \geq 0 \\ -4x + 4 \; ; x < 0 \end{cases}$

$\lim\limits_{x \to 0+} g(x) =$

A. Does not exist
B. 5
C. 4
D. 3
E. None of the above

5	$g(x) = \begin{cases} x \; ; x > 2 \\ -3 \; ; x \leq 2 \end{cases}$

$\lim\limits_{x \to 2+} g(x) =$

A. Does not exist
B. 3
C. 2
D. -3
E. None of the above

6	A function is graphed below. What is the limit as you approach -2 from the right?
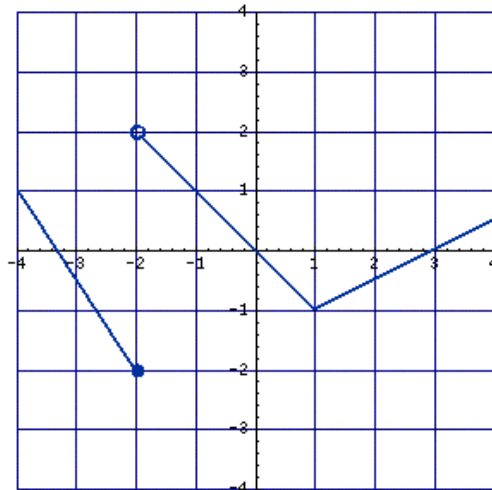
A. 3
B. 2
C. Does not exist
D. -2
E. None of the above

7	Write the equation of the line: Parallel to the line: $4x + 3y = -3$ Going through $(2,-5)$ A. $y = \frac{-4}{3}x + \frac{7}{3}$ B. $y = \frac{4}{3}x + \frac{7}{3}$ C. $y = \frac{4}{3}x - \frac{7}{3}$ D. $y = \frac{-4}{3}x - \frac{7}{3}$ E. None of the above
8	$\lim\limits_{x \to -4+} \dfrac{2x^2 + 10x + 8}{x + 4} =$ A. 0 B. Does not exist C. -6 D. -7 E. None of the above
9	Write the equation of the line: Perpendicular to the line: $2x - 4y = -1$ Going through $(3,4)$ A. $y = -2x - 10$ B. $y = -2x + 10$ C. $y = \frac{1}{2}x + 10$ D. $y = \frac{1}{2}x - 10$ E. None of the above
10	Write the equation of the line: Going through $(-3,1)$ and $(1,-5)$ A. $y = \frac{3}{2}x + \frac{7}{2}$ B. $y = \frac{3}{2}x - \frac{7}{2}$ C. $y = \frac{-3}{2}x + \frac{7}{2}$ D. $y = \frac{-3}{2}x - \frac{7}{2}$ E. None of the above

11	Write the equation of the line:
	Having slope: $^{-9}/_{10}$ and going through (1,2)
	A. $y = ^{-9}/_{10} x - ^{29}/_{10}$
	B. $y = ^{9}/_{10} x + ^{29}/_{10}$
	C. $y = ^{9}/_{10} x - ^{29}/_{10}$
	D. $y = ^{-9}/_{10} x + ^{29}/_{10}$
	E. None of the above
12	Factor fully:
	$13c - 18c^3 u$
	A. $c(13 - 18c^2 u)$
	B. $(c - 18c^2 u)(13)$
	C. $(c)(13 - 18c^3 u)$
	D. $(c - 18c^3 u)(13)$
	E. None of the above
13	Factor fully:
	$r^2 + r - 12$
	A. $(r - 3)(r + 4)$
	B. $(r + 3)(r + 4)$
	C. $(r - 3)(r - 4)$
	D. $(r + 3)(r - 4)$
	E. None of the above
14	Factor fully:
	$5e^2 + 12e + 4$
	A. $(e - 2)(5e + 2)$
	B. $(e - 2)(5e - 2)$
	C. $(e + 2)(5e - 2)$
	D. $(e + 2)(5e + 2)$
	E. None of the above
15	Factor fully:
	$16u^2 - 25$
	A. $(4u + 5)^2$
	B. $(4u + 5)(4u - 5)$
	C. $(4u - 5)(-2u^5)$
	D. $(4u - 5)(4u - 5)$
	E. None of the above

16	Factor fully: $32w^4 + 108w$ A. $(4w)(2w + 3)(4w^2 -6w -9)$ B. $(4w)(2w + 3)^3$ C. $(4w)(2w + 3)(4w^2 -6w + 9)$ D. $(4w)(2w + 3)(4w^2 + 6w + 9)$ E. None of the above
17	Factor fully: $4b^4 -37b^2 + 9$ A. $(2b -1)(2b + 1)(b -3)(b + 3)$ B. $(b -3)(b + 3)(4b^2 -1)$ C. $(2b -1)(2b + 1)(b^2 -9)$ D. $(2b -1)^2(b -3)^3$ E. None of the above
18	Factor fully: $6e^3+ 2e^2-3e-1$ A. $(2e^2-1)^2$ B. $(3e+ 1)(2e^2-1)$ C. $(3e+ 1)^2$ D. $(2e^2-1)$ E. None of the above
19	$$\lim_{x \to -1} \frac{-3x^2 + x + 4}{x + 1} =$$ A. 10 B. 7 C. 6 D. Does not exist E. None of the above