Multiple-Choice:
Record all answers to the multiple-choice questions here. To clearly distinguish between A and D, it is recommended that you use capital letters. *(2 points each)*

Free-Response: (28 points total)
You must show a reasonable amount of work that leads to your answer. Where it is

#37-40: Find each limit algebraically. If the limit does not exist, explain why.

37. $\lim_{x\to 2} \frac{\sqrt{11-x}-3}{x-2}$ *(6 points)*

38. $\lim_{x\to 5} \frac{x^2-4x-5}{3x^2-75}$ *(5 points)*

39. $f(x) = \begin{cases} 4x+5, x<-2 \\ x^2+9, -2\le x\le 0 \\ (x+3)^2, 0<x<3 \\ \sqrt{3x+7}, x\ge 3 \end{cases}$ *(11 points)*

$\lim_{x\to -2} f(x) =$
$\lim_{x\to -1} f(x) =$
$\lim_{x\to 0} f(x) =$
$\lim_{x\to 1} f(x) =$
$\lim_{x\to 3} f(x) =$

#40: Find the indicated limit for f(x) = $-3x^2 - 7x + 1$ *(6 points)*

If the limit does not exist, explain why the limit does not exist. YOU MUST SHOW ALL WORK…THE LONG WAY!! (No "shortcut"!!)

$$\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$$

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Intro to Calculus Review

Evaluate each limit.

1) $\lim_{x \to 1} (2x + 1)$

A) -1 B) 3
C) -6 D) 1

2) $\lim_{x \to 2} (x - 2)$

A) 5 B) 0
C) -6 D) -4

3) $\lim_{x \to 0} -\sqrt{2x + 5}$

A) $-\sqrt{5}$ B) $-3\sqrt{13}$
C) 3 D) $6\sqrt{3}$

4) $\lim_{x \to 1} -\sqrt[3]{-2x + 4}$

A) $-\sqrt[3]{2}$ B) -5
C) -4 D) -2

5) $\lim_{x \to -2^+} \lfloor -x - 1 \rfloor$

A) 0 B) -10
C) 5 D) -4

6) $\lim_{x \to -1^+} f(x),\ f(x) = \begin{cases} -x^2 - 4x - 3, & x < -1 \\ -2x - 6, & x \geq -1 \end{cases}$

A) 0 B) -11
C) -1 D) -4

7) $\lim_{x \to -1} \lfloor -x - 2 \rfloor$

A) Does not exist. B) 1
C) 4 D) -3

8) $\lim_{x \to -2} (|x + 2| + 3)$

A) 3 B) 1
C) 12 D) Does not exist.

9) $\lim_{x \to 3^+} f(x),\ f(x) = \begin{cases} x - 1, & x \leq 3 \\ x^2 - 8x + 17, & x > 3 \end{cases}$

A) 12 B) 11
C) 2 D) -4

10) $\lim_{x \to -1} \dfrac{-2x - 2}{|-x - 1|}$

A) Does not exist. B) 4
C) -6 D) -8

11) $\lim_{x \to -3} -\dfrac{x + 3}{x^2 + 2x - 3}$

A) $\dfrac{1}{4}$ B) -1
C) 1 D) $\dfrac{1}{11}$

12) $\lim_{x \to 2} -\dfrac{x^2 - 3x + 2}{x - 2}$

A) -3 B) -1
C) -5 D) -7

13) $\lim_{x \to 0} \dfrac{x}{\dfrac{1}{1 + x} - 1}$

A) 0 B) 4
C) 9 D) -1

14) $\lim_{x \to 9} \dfrac{x - 9}{\sqrt{x} - 3}$

A) -3 B) 0
C) 6 D) 5

15) $\lim_{x \to -1^-} \dfrac{x+2}{x^2+2x+1}$

A) ∞ B) 8
C) $-\infty$ D) -10

16) $\lim_{x \to -3^+} \dfrac{3}{x+3}$

A) ∞ B) $-\infty$
C) -5 D) 4

17) $\lim_{x \to -3^-} -\dfrac{3}{x^2-9}$

A) ∞ B) $-\infty$
C) 2 D) 6

18) $\lim_{x \to 3} -\dfrac{2x}{x-3}$

A) ∞ B) -9
C) Does not exist. D) $-\infty$

19) $\lim_{x \to -\frac{3\pi}{4}} -2\sec(2x)$

A) $-\infty$ B) 7
C) ∞ D) Does not exist.

20) $\lim_{x \to -2^+} -\dfrac{x^2}{2x+4}$

A) ∞ B) $\dfrac{1}{4}$
C) $-\infty$ D) 4

21) $\lim_{x \to \infty} \dfrac{-x-3}{x^2+x+1}$

A) 1 B) $-\infty$
C) ∞ D) 0

22) $\lim_{x \to -\infty} -\dfrac{2x}{x+1}$

A) -2 B) ∞
C) $-\infty$ D) 0

23) $\lim_{x \to -\infty} \dfrac{x+3}{\sqrt{4x^2+3}}$

A) $\dfrac{3}{2}$ B) $-\infty$
C) $-\dfrac{1}{2}$ D) ∞

24) $\lim_{x \to \infty} \dfrac{x+3}{\sqrt{4x^2+1}}$

A) $\dfrac{1}{2}$ B) $-\infty$
C) $\dfrac{9}{4}$ D) ∞

25) $\lim_{x \to \infty} -4x\sin\dfrac{1}{x}$

A) Does not exist. Oscillates.
B) -4
C) $-\infty$
D) ∞

26) $\lim_{x \to \infty} \left(-e^x - 5\right)$

A) 1 B) $-\infty$
C) 4 D) ∞

Differentiate each function with respect to *x*.

27) $y = x^5$

A) $\dfrac{dy}{dx} = 5x^5$ B) $\dfrac{dy}{dx} = x^4$
C) $\dfrac{dy}{dx} = 5x$ D) $\dfrac{dy}{dx} = 5x^4$

28) $f(x) = x$

A) $f'(x) = 1$ B) $f'(x) = 0$
C) $f'(x) = 3x$ D) $f'(x) = x$

29) $f(x) = -3x^{-2} + 3x^{-4}$

A) $f'(x) = 6x^{-2} - 12x^{-4}$
$= \frac{6}{x^2} - \frac{12}{x^4}$

B) $f'(x) = 6x^{-3} - 12x^{-5}$
$= \frac{6}{x^3} - \frac{12}{x^5}$

C) $f'(x) = 6x - 12x$
$= -6x$

D) $f'(x) = -3x^{-3} + 3x^{-5}$
$= -\frac{3}{x^3} + \frac{3}{x^5}$

30) $f(x) = 4x^4 - \frac{2}{5}x^{-4}$

A) $f'(x) = 16x^4 + \frac{8}{5}x^{-4}$
$= 16x^4 + \frac{8}{5x^4}$

B) $f'(x) = 4x^3 - \frac{2}{5}x^{-5}$
$= 4x^3 - \frac{2}{5x^5}$

C) $f'(x) = 16x + \frac{8}{5}x$
$= 16x + \frac{8x}{5}$

D) $f'(x) = 16x^3 + \frac{8}{5}x^{-5}$
$= 16x^3 + \frac{8}{5x^5}$

31) $y = -5x^5 - 5x^3 - 3x^2$

A) $\frac{dy}{dx} = -25x - 15x - 6x$
$= -46x$

B) $\frac{dy}{dx} = -25x^4 - 15x^2 - 6x$

C) $\frac{dy}{dx} = -25x^5 - 15x^3 - 6x^2$

D) $\frac{dy}{dx} = -5x^4 - 5x^2 - 3x$

32) $y = 3x^5 - \frac{1}{4}x^4 + x$

A) $\frac{dy}{dx} = 15x - x + x$
$= 15x$

B) $\frac{dy}{dx} = 15x^4 - x^3 + 1$
$= 15x^4 - x^3 + 1$

C) $\frac{dy}{dx} = 15x^5 - x^4 + x$
$= 15x^5 - x^4 + x$

D) $\frac{dy}{dx} = 3x^4 - \frac{1}{4}x^3 + 1$
$= 3x^4 - \frac{x^3}{4} + 1$

For each problem, find the equation of the line tangent to the function at the given point. Your answer should be in slope-intercept form.

33) $f(x) = \frac{x^2}{2} + x + \frac{1}{2}$ at $\left(2, \frac{9}{2}\right)$

A) $y = 0$
B) $y = 2x$
C) $y = 5x - \frac{15}{2}$
D) $y = 3x - \frac{3}{2}$

34) $f(x) = x^2 + 1$ at $(2, 5)$

A) $y = 2x$
B) $y = -4x - 3$
C) $y = 4x - 3$
D) $y = 8x - 15$

For each problem, find the equation of the line normal to the function at the given point. If the normal line is a vertical line, indicate so. Otherwise, your answer should be in slope-intecept form.

35) $y = x^3 - 3x^2 + 4$ at $(3, 4)$

A) $y = -\frac{1}{24}x + \frac{121}{6}$

B) $y = -\frac{1}{9}x + \frac{13}{3}$

C) $y = -\frac{1}{72}x - \frac{1945}{18}$

D) $y = -\frac{1}{24}x - \frac{193}{12}$

36) $y = -x^3 + 2x^2 - 1$ at $(2, -1)$

A) $y = \frac{1}{15}x - \frac{51}{5}$

B) $y = \frac{1}{39}x + \frac{573}{13}$

C) $y = \frac{1}{7}x + \frac{15}{7}$

D) $y = \frac{1}{4}x - \frac{3}{2}$

Answers to Intro to Calculus Review (ID: 1)

1) B	2) B	3) A	4) A
5) A	6) D	7) A	8) A
9) C	10) A	11) A	12) B
13) D	14) C	15) A	16) A
17) B	18) C	19) D	20) C
21) D	22) A	23) C	24) A
25) B	26) B	27) D	28) A
29) B	30) D	31) B	32) B
33) D	34) C	35) B	36) D