ALBERTA DISTANCE LEARNING CENTRE
Mathematics 31 Online
MAT3211
Unit 1B Assignment

Student's Questions and Comments

FOR STUDENT USE ONLY

(if label is missing or incorrect)
Student ID:

_____

Please use the pre-printed label for this course and Assignment

Name

Address

City/Town **Province** **Postal Code**

Apply Assignment Label Here

FOR ADLC USE ONLY

Assigned to

_____

Marked by

_____

Date received

_____

Summary

	Marks Earned	Total Marks	Percent
Unit 1B Assignment		**76**	

Teacher's Comments:

_____

Teacher's Signature

REVISED September 2018

CANADIAN CATALOGUING IN PUBLICATION DATA

MAT3211
Mathematics 31 Online
ISBN: 978-1-927090-60-2
Unit 1B Assignment

4601 - 63 Avenue
Barrhead, Alberta Canada T7N 1P4

Printed in Canada

For Users of Alberta Distance Learning Centre Courseware
Much time and effort is involved in preparing learning materials and activities that meet curricular expectations as determined by Alberta Education. We ask that you respect our work by honouring copyright regulations.

Alberta Distance Learning Centre website:

http://www.adlc.ca

The Internet can be a valuable source of information. However, because publishing to the Internet is neither controlled nor censored, some content may be inaccurate or inappropriate. Students are encouraged to evaluate websites for validity and to consult multiple sources.

Mathematics 31 Online

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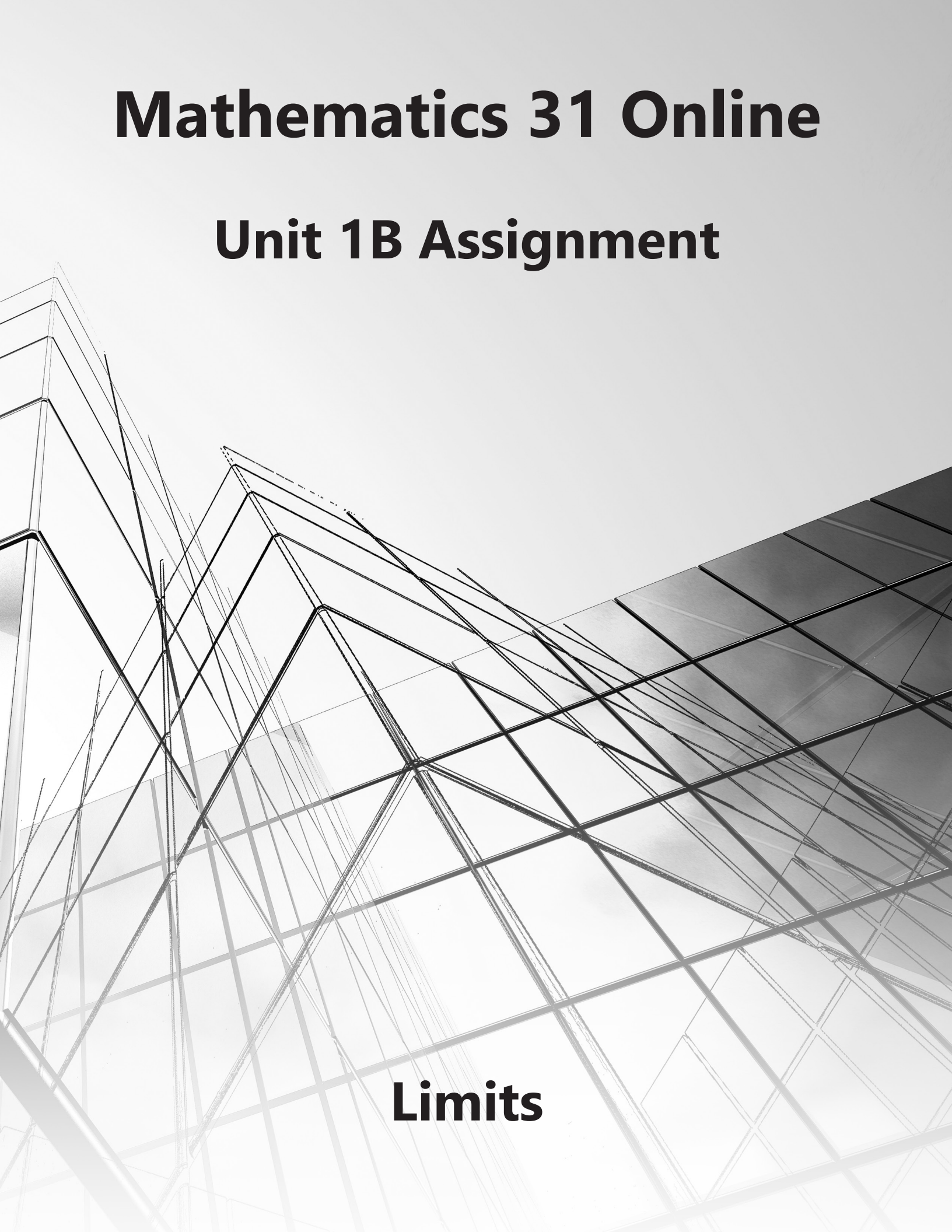

Limits

Submission Instructions

You will submit your assignments online by uploading them to your course in Moodle. Once you log in to your course, you will find more detailed submission instructions provided by your teacher.

Go to this website to learn how to log in to Moodle:
http://quick.adlc.ca/login

If you have further questions about submitting your work, please contact your teacher.

Mathematics 31 Online

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Our Pledge to You:

Enrolling in this course is another step toward an Alberta High School Diploma. Everyone at Alberta Distance Learning Centre is committed to helping students achieve their educational goals. We welcome your contact in person or by phone, fax, e-mail, voice mail, or postal mail.

Advice:

Your achievement in this course is determined by your success in the assessments of each unit. Your responses to assignments indicate your understanding of outcomes established by Alberta Education.

- Before responding to the assigned questions, read all relevant directions for the Assignment and instruction in the course materials, including the appropriate Guide for Learning and any other resources provided.

- When you encounter difficulties, re-read the directions for the Assignment and review the relevant instruction in the Guide for Learning.

- If you require further clarification, contact your Alberta Distance Learning Centre teacher for assistance.

Notice:

You have one opportunity to submit each Assignment.

- Only under exceptional circumstances will your ADLC teacher re-assess your work. Therefore, apply significant effort to each Assignment.

- If your final exam mark is vastly different from your Quiz marks, your teacher may apply discretion in determining your course mark.

Format

You are encouraged to **handwrite** your written work.

If you type your work, be sure to follow these guidelines:

- Include your full name and student file number as a document header.
- Double-space your final copy.
- Staple your printed work to this Assignment.

ADLC Plagiarism Policy (ADLC Administrative Policy 60–1)

Plagiarism is the practice of representing someone else's work or ideas as one's own. It is an academically dishonest practice and is detrimental to a student's knowledge and skill development. ADLC takes a progressive approach to plagiarism to educate and correct the behaviour.

All incidents will be documented and are subject to the consequences outlined below:

First Incident	Second Incident	Third Incident
The student is given zero scores on any work suspected of being plagiarized and given the opportunity to resubmit original work.	The student is given zero scores on any work suspected of being plagiarized and is not given the opportunity to resubmit original work. A letter is sent by the principal to parents and school facilitators outlining this administrative practice and the consequences.	The student is removed from the course in which plagiarized work is suspected and notifications are put into the ADLC Student Information System, barring future registration to the course in question. A withdrawal letter is sent by the principal to parents and school facilitators.

Important

While removal from a course is limited to the course in which the third incident has occurred, the preceding steps can occur across different courses. A student who has been found plagiarizing in Course A and held to the First Incident consequences who then plagiarizes in Course B will move to the Second Incident consequences.

Any further occurrences after the Third Incident in any other courses will result in immediate removal from that course. Ongoing occurrences may result in removal from all courses and barring of registration with ADLC.

Sharing of ADLC Work (ADLC Administrative Policy 60–4)

Plagiarism is the practice of representing someone else's work or ideas as one's own. It is a dishonest practice and is damaging to a student's knowledge & skill development. Plagiarism is addressed in ADLC Administrative Policy 60-01.

The sharing of school work, especially after having been marked by ADLC, to students for the purposes of submitting plagiarized work (either paraphrasing or directly copying student work) is dishonest, and this sharing goes against the Alberta School Act's expectation of students to respect school rules and co-operate with how schools offer education to their students.

ADLC prefers to take a progressive approach to the sharing of work with other students, in order to educate and correct the behaviour.

If a student is currently enrolled in any ADLC course and found to be sharing school work, whether from their current course or another, to others, the following will happen:

First Incidence	Second Incidence
The student is informed that their work has been submitted as plagiarized work by another student; a warning is provided that further submissions of such work, from any course, will be grounds for removal from the current course(s).	The student is removed from all active ADLC courses.

If the student is not currently enrolled in any ADLC course and found to be sharing school work with others, they are informed that their work has been submitted as plagiarized work by another student and, as such, further registrations in any ADLC course will not be permitted. The incident will be recorded on the student's file.

Such actions do not limit ADLC to pursue other remedies (actions), either criminal or civil, for the distribution of its copyrighted materials.

Unit 1B Assignment

Work slowly and carefully. If you are having difficulty, go back and review the appropriate *Lesson*.

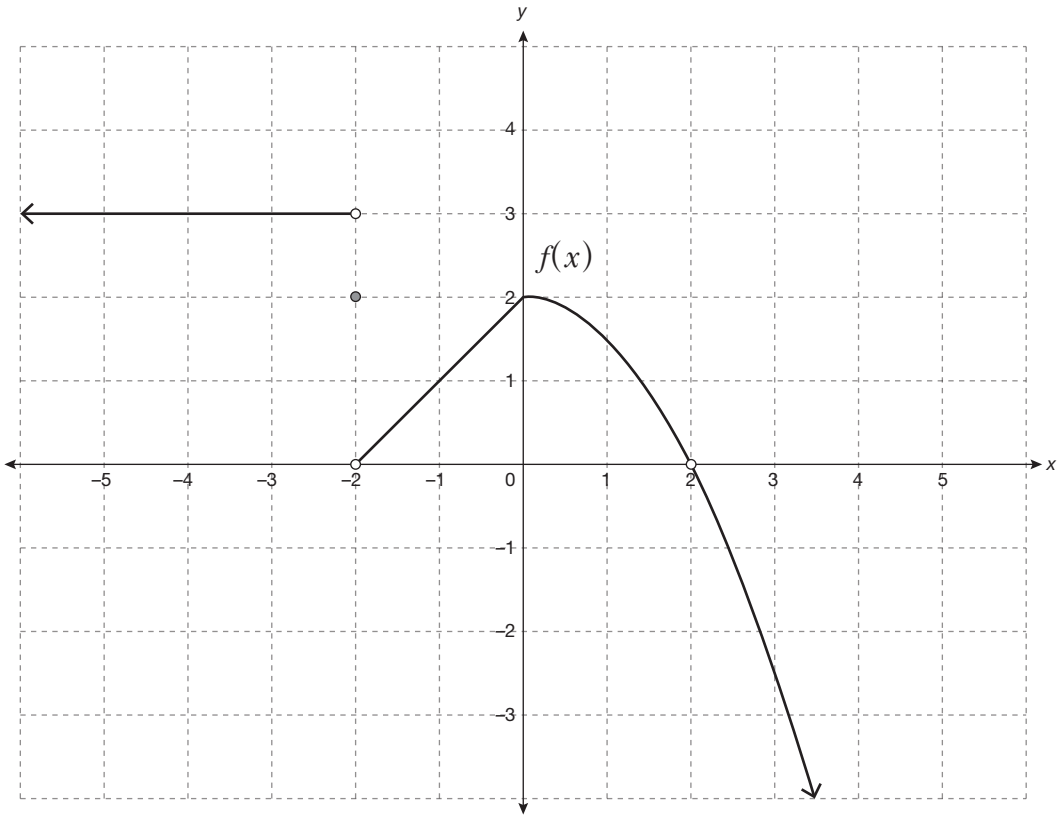
As your midterm and final exams do not allow calculators, it is best to attempt all questions in this *Assignment* without a calculator.

Be sure to proofread your assignment carefully.

For full marks, show all calculations, steps, and/or explain your answers.

Total: 76 marks.

1. Use the graph of $y = f(x)$, shown below, to answer the following questions.



(6) a. Complete the chart.

	Limit	Answer
i.	$\lim_{x \to -2^-} f(x)$	
ii.	$\lim_{x \to -2^+} f(x)$	
iii.	$\lim_{x \to -2} f(x)$	
iv.	$f(-2)$	
v.	$\lim_{x \to 0^-} f(x)$	
vi.	$\lim_{x \to 0^+} f(x)$	
vii.	$\lim_{x \to 0} f(x)$	
viii.	$\lim_{x \to 2^-} f(x)$	
ix.	$\lim_{x \to 2^+} f(x)$	
x.	$\lim_{x \to 2} f(x)$	
xi.	$f(2)$	
xii.	$f(-1)$	

(2) b. Is this a continuous or discontinuous function? Explain.

2. A piecewise function is defined as follows.

$$f(x) = \begin{cases} (x+2)^2 - 1 & -3 \le x < 0 \\ 1 & x = 0 \\ x - 2 & 0 < x < 4 \\ 2 & x > 4 \end{cases}$$

(4) a. Sketch the graph of $y = f(x)$.

(3) b. Determine the following limits, if they exist.

i. $\lim\limits_{x \to 0^-} f(x)$ _____

ii. $\lim\limits_{x \to 0^+} f(x)$ _____

iii. $\lim\limits_{x \to 0} f(x)$ _____

iv. $\lim\limits_{x \to 4^-} f(x)$ _____

v. $\lim\limits_{x \to 4^+} f(x)$ _____

vi. $\lim\limits_{x \to 4} f(x)$ _____

(2) c. State any points of discontinuity on the graph of $y = f(x)$. Explain.

(3) 3. Evaluate the following limits for the piecewise function defined below.

$$f(x) = \begin{cases} x^2 + 2x - 3, x < -4 \\ x, x = -4 \\ -\frac{3}{4}x, x > -4 \end{cases}$$

a. $\lim\limits_{x \to -4^+} f(x)$

b. $\lim\limits_{x \to -4^-} f(x)$

c. $\lim\limits_{x \to -4} f(x)$

4. Find each limit algebraically.

(1) a. $\lim_{x \to -1} \frac{2x+1}{x}$

(1) b. $\lim_{x \to 8} (-3)$

(2) c. $\lim_{h \to 2} \frac{h^2+2h-8}{h-2}$

(2) d. $\lim_{x \to 2} \frac{x^2-4x+4}{x^2+x-6}$

(2) e. $\lim_{x \to 0} \frac{x^2 + x}{x}$

(2) f. $\lim_{x \to 2} \frac{x^2 - 9}{2x^2 - x - 15}$

(2) g. $\lim_{x \to 0} \frac{x}{\sqrt{x+4} - 2}$

(2) h. $\lim\limits_{x \to 1} \dfrac{\dfrac{1}{x^2} - x}{x - 1}$

(2) i. $\lim\limits_{x \to 1} \dfrac{\dfrac{1}{\sqrt{x}} - 1}{x - 1}$

(2) j. $\lim_{x \to 0} \frac{(1-x)^3 - 1}{x}$

(4) 5. Show $\lim_{x \to 2}(x^3 - 2x) = (\lim_{x \to 2} x)^3 - \lim_{x \to 2} 2x$

Left Side	Right Side
Left Side = Right Side	

6. Using limit theorems, evaluate the following limits, where $\lim_{x \to a} f(x) = 1$, $\lim_{x \to a} g(x) = 4$, and $\lim_{x \to a} h(x) = -2$. Show all work.

(2) a. $\lim_{x \to a}\left(\frac{f(x)\,g(x)}{h(x)}\right)$

(4) b. $\lim_{x \to a}\left(\frac{\sqrt{h(x)+6}}{[g(x)]^2} f(x)\right)$

7. Evaluate the following limits, if they exist. Where applicable, show all work.

(1) a. $\lim_{x \to \infty} \frac{x^2}{99}$

(1) b. $\lim_{x \to \infty} \left(\frac{29}{14}\right)^x$

(1) c. $\lim_{x \to \infty} \left(\frac{7}{9}\right)^x$

(1) d. $\lim_{x \to -\infty} 3^{-x}$

(2) e. $\lim_{x \to \infty} \frac{2 - x}{x + 4}$

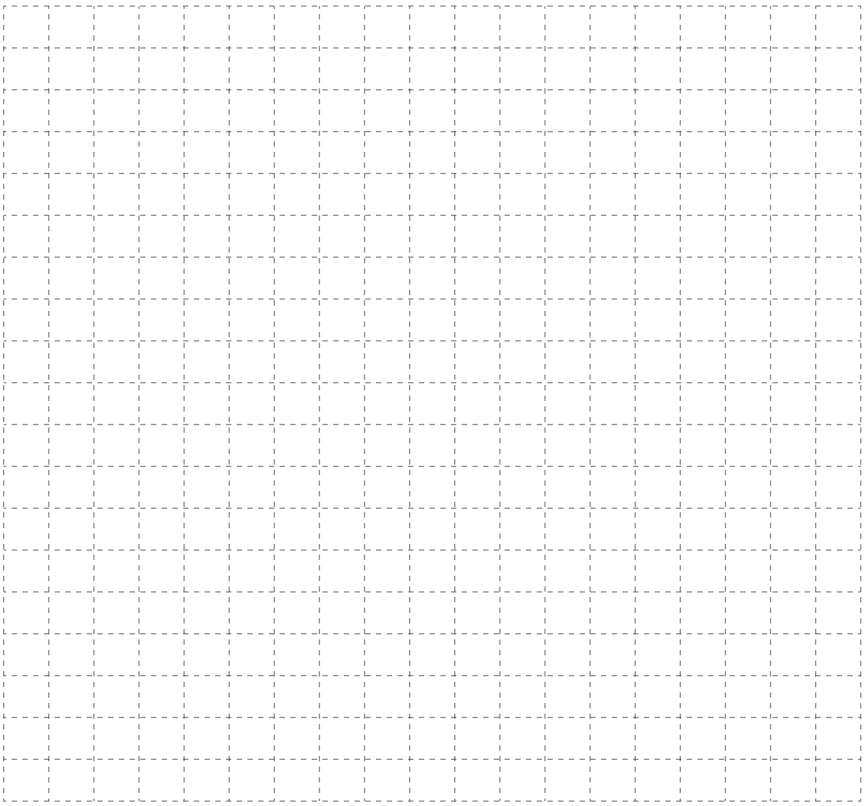
(2) f. $\lim_{x \to -\infty} \frac{6x^2 + 5x - 7}{3x^4 + 10}$

(2) g. $\lim_{x \to -\infty} \frac{4x^6}{x^3 - 8}$

(4) h. $\lim_{x \to \pm\infty} \frac{\sqrt{2x^2 - 1}}{x + 3}$

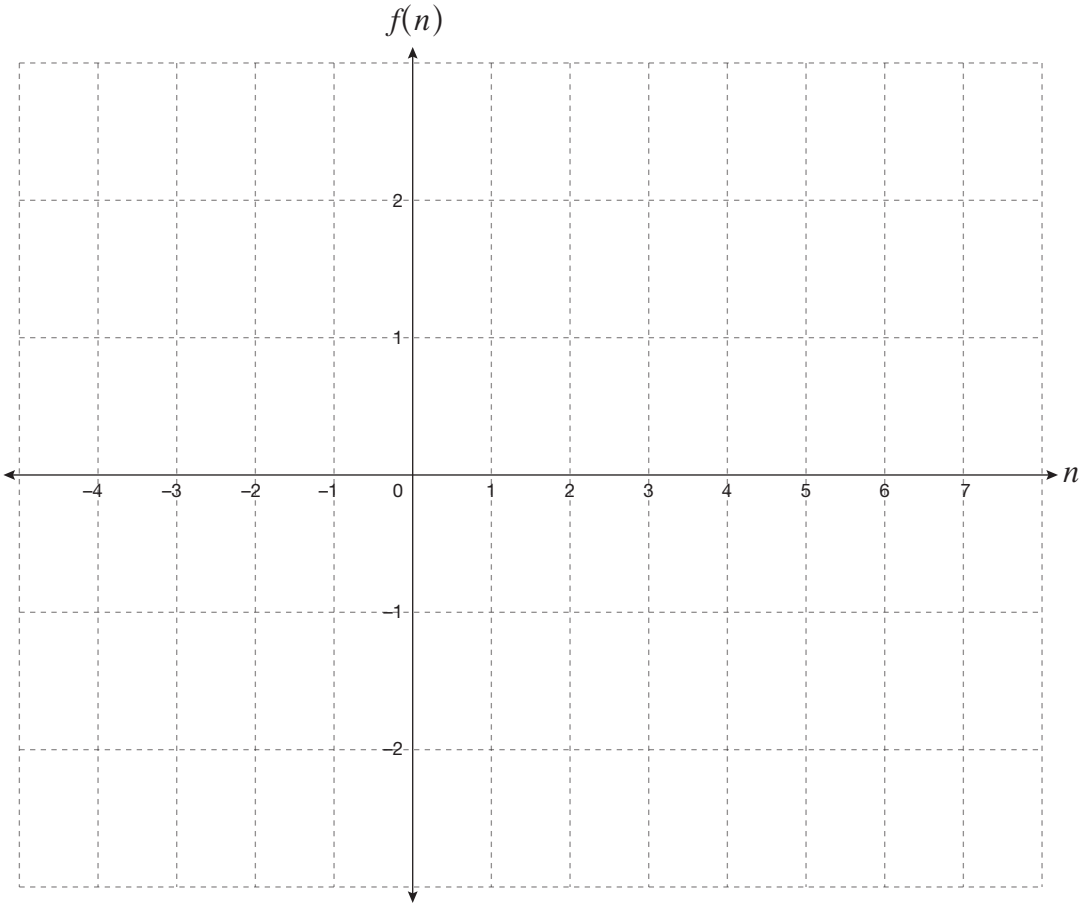
(2) 8. Sketch a possible graph for a function with the following properties.

$$\lim_{x \to \infty} f(x) = -3$$
$$\lim_{x \to 1^-} f(x) = \infty$$
$$\lim_{x \to -\infty} f(x) = -3$$
$$\lim_{x \to 1^+} f(x) = -\infty$$



9. The general term of a sequence is defined by $f(n) = (-1)^{n+1}\left(\frac{2n-1}{n}\right)$.

(2) a. Find the first five terms of the sequence, and graph the results.



(2) b. Determine if the sequence is convergent or divergent. If the sequence is convergent, determine its limit. If the sequence is divergent, explain why.

(2) 10. A pendulum on its first swing traces out a path $50\ \text{cm}$ in length. On each successive swing, it traces out a path that is 90% as long. The total distance swept out by the swings of the pendulum forms an infinite geometric series. Determine the total distance the pendulum travels before coming to rest.

(2) 11. Find the sum of the infinite geometric $1 + (x+1) + (x+1)^2 + (x+1)^3 + \ldots$ if $|x+1| < 1$.

(2) 12. Find the values of x for which the infinite geometric series $(x-2)^1+(x-2)^2+(x-2)^3+...$ is convergent.

(2) 13. The second term in an infinite geometric series is $-\frac{1}{2}$ and the third term is $\frac{3}{2}$. Is it possible to determine the sum of this series? Explain.

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Revised September 2018