



# FINAL EXAM REVIEW 2

MA 16100 • FALL 2022

DR. HOOD



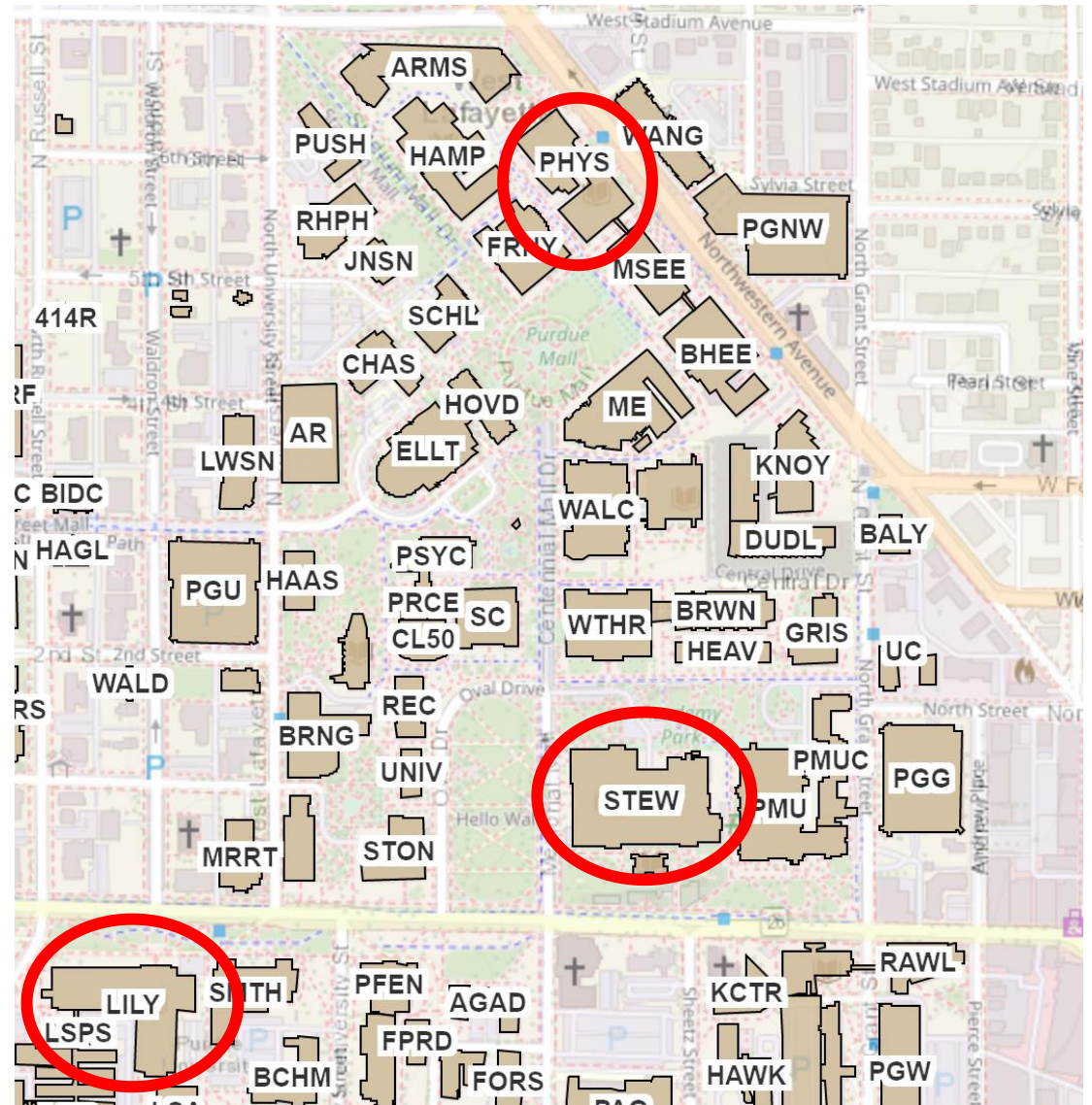
# WARM UP – LEC 100

Which question from the Final Exam on Fall 2018 (Questions 1-13) do you most want to see?

- 1) Domain
- 2) Functions + Fractions
- 3) Asymptotes
- 4) Limits
- 5) Velocity + Acceleration
- 6) Limits
- 7) Limits (L'Hopital's Rule)
- 8) L'Hopital's Rule
- 9) Half Life
- 10) Quotient Rule
- 11) Logarithms
- 12) Deriv of Inverse Trig Fcns
- 13) Chain Rule

# 1. WHEN/WHERE IS FINAL?

- Tuesday Dec 13
- 8:00-10:00am
- We will be in multiple rooms for this Exam
  - STEW
  - LILY
  - PHYS



# 1. WHERE IS THE FINAL?

Loeb Playhouse (STEW 183)

Main Floor

- Grouped by TA:
  - Mithun Krishnan
  - Ian Jackson
  - Moacir Becker
  - Sree Duvva
  - Jaden Dasiuk



# 1. WHERE IS THE FINAL?

Loeb Playhouse (STEW 183)

Balcony

- Grouped by TA:
  - Sanjana Pedada
  - Chrisil Ouseph
  - Joseph Galkowski

Row	1	2	3	4	5	6	7	8	9	10	11	12	13	14
NN	101	103	105	107	109	111	113							
MM	101	103	105	107										
LL	101	103	105	107	109	111								
KK	101	103	105	107	109	111								
JJ	101	103	105	107	109	111								
HH	101	103	105	107	109	111								
GG	101	103	105											
FF	101	103	105										119	121 123 125
EE	101	103	105										119	121 123 125
DD	101	103	105	107	109	111	113	115	117	119	121	123	125	127
CC	101	103	105	107	109	111	113	115	117	119	121	123	125	127
BB	101	103	105	107	109	111	113	115	117	119	121	123	125	
AA	101	103	105	107	109	111	113	115	117	119	121	123	125	





# 1. WHERE IS THE FINAL?

PHYS 114

- Grouped by TA:
  - Tyler Dunaisky and Alex Hsu

Back of Room

M1	M2	M3	M4	M5
L1	L2	L3	L4	L5
ADA table				
I1	I2	I3		
H1	H2	H3	H4	H5
Tyler Dunaisky				
C1	C2	C3	C4	C5
B1	B2	B3	B4	B5
	A2	A3	A4	A5

Tables with stools

	06	07	08	09	010	011	012	013	014								
N	N6	N7	N8	N9	N10	N11	N12	N13	N14	N15	N16	N					
M	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M	M17	M18	M19	M20	M21
L	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L	L17	L18	L19	L20	L21
K	K6	K7	K8	K9	K10	K11	K12	K13	K14	K15	K16	K	K17	K18	K19	K20	K21
J	J6	J7	J8	J9	J10	J11	J12	J13					J19	J20	J21		
I	I6	I7	I8	I9	I10	I11	I12	I13					I19	I20	I21		
H	H6	H7	H8	H9	H10	H11	H12	H13	Alexander Hsu			H19	H20	H21			
G	G6	G7	G8	G9	G10	G11	G12	G13					G19	G20	G21		
F	F6	F7	F8	F9	F10	F11	F12	F13					F19	F20	F21		
E	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16	E	E17	E18	E19	E20	E21
D	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D	D17	D18	D19	D20	D21
C	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C	C17	C18	C19	C20	C21
B	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B	B17	B18	B19	B20	B21
A	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A	A17	A18	A19	A20	

# 1. WHERE IS THE FINAL?

PHYS 223

- Grouped by TA:
  - Krishna Thakkar

	1	2	3	4	5	6	7	8	9	10	11	
L						L6	L7	L8	L9	L10	L11	L
K						K6	K7	K8	K9	K10	K11	K
J	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J
I	I1	I2	Krishna Thakkar			I6	I7	I8	I9	I10	I11	I
H	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H
G	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G
F	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F
E	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E
D	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D
C	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C
B	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B
A			A3	A4	A5							A

MA 16100

FINAL

Tuesday, Dec. 13, 2022

8:00 a.m.

PH PHYS 223










# 2. ASSIGNED SEATS

Students will be assigned seats.

(posted next week)

Your room and assigned seat will be posted in the Brightspace Gradebook.

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# 3. WHAT IS THE EXAM FORMAT?

- Face-to-face and multiple-choice
- 25 Questions worth 4 points each
  - Total =  $25 \times 4 = 100$
- Question order will be random

# 3. WHAT IS ON THE EXAM?

- Final Exam is cumulative (covers Lessons 0 – 35)
- Approximate distribution of questions:

Topics from Exam 1	Topics from Exam 2	Topics from Exam 3	Topics on New Material
Lessons 0 – 10	Lessons 11 – 19	Lessons 20 – 30	Lessons 31 – 35
6 Questions	6 Questions	6 Questions	5-6 Questions

\* Plus 1-2 Questions chosen randomly

# 4. WHAT CAN I USE ON THE EXAM?

Notes, books, calculators, and electronic devices are not permitted.

**Please bring to the exam:**

**Put away (and turn off) all:**

Number 2 pencil

Notes

PUID

Textbook

Your REC section number

Calculator

Your TA's name

Other electronic devices

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# 6. RULES FOR ARRIVING LATE

<b>Timer:</b>	<b>Late Arrivals:</b>	<b>Leaving Early:</b>
Timer starts at 120 minutes and counts down	Can students who arrive to the exam late take the exam?	Can students who finish the exam leave early?
120 min – 100 min	Yes	No
100 min – 10 min	No*	Yes
10 min – 0 min	No*	No

- Students who arrive after the first 20 minutes must talk to Dr. Hood to arrange for an alternate exam with a 20% late penalty



1. Suppose the domain of  $f(x)$  is  $[0, \infty)$ . If

$$g(x) = 1 - f(x + 1)$$

then what is the domain of the function  $g$  ?

- A.  $(-\infty, 1]$
- B.  $(-\infty, -1]$
- C.  $[-1, \infty)$
- D.  $[0, \infty)$
- E.  $[1, \infty)$

2. If  $f(x) = \frac{x + 5}{x + 1}$ , simplify the expression

$$\frac{f(x) - f(3)}{x - 3}$$

A.  $\frac{-2}{x - 3}$

B.  $\frac{-1}{x + 1}$

C.  $\frac{-4}{(x + 1)^2}$

D.  $\frac{3 - x}{x + 1}$

E.  $\frac{x + 3}{x - 3}$

3. The curve

$$y = \frac{1 - 2x}{x^3 - 1}$$

has one horizontal asymptote,  $y = h$ , and one vertical asymptote,  $x = k$ . What is  $h + k$  ?

- A. 1
- B. 3
- C.  $-1$
- D.  $\frac{1}{2}$
- E.  $\frac{3}{2}$

4. Consider the function

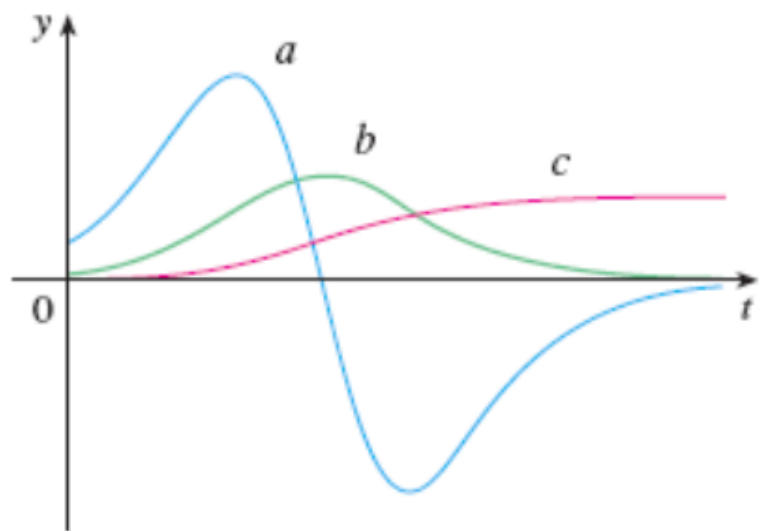
$$f(x) = \begin{cases} -1 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ 1 & \text{if } x > 0 \end{cases}$$

Which of the following limits exist?

$$(i) \lim_{x \rightarrow 0^+} f(x) \quad (ii) \lim_{x \rightarrow 0} f(x) \quad (iii) \lim_{x \rightarrow 0} |f(x)|$$

- A. (i) only
- B. (i) and (iii) only
- C. (ii) and (iii) only
- D. (ii) only
- E. (iii) only

5. The figure shows the graphs of three functions. One is the position function of a car, one is the velocity of the car, and one is its acceleration. Find the correct choice.



- A.  $a =$  acceleration,  $b =$  position,  $c =$  velocity
- B.  $a =$  velocity,  $b =$  position,  $c =$  acceleration
- C.  $a =$  acceleration,  $b =$  velocity,  $c =$  position
- D.  $a =$  position,  $b =$  velocity,  $c =$  acceleration
- E.  $a =$  velocity,  $b =$  acceleration,  $c =$  position

6. Find the limit.

$$\lim_{x \rightarrow 2} \sqrt{\frac{x^2 - 4}{x - 2}}$$

- A. Does not exist
- B. 0
- C. 4
- D. 2
- E.  $\infty$

7. Find the limit.

$$\lim_{x \rightarrow 0} \frac{\csc(3x)}{\cot x}$$

- A.  $\frac{1}{3}$
- B.  $\infty$
- C. 1
- D. Does not exist
- E. 3



8. Find the limit.

$$\lim_{x \rightarrow \infty} \left( 1 + \frac{3}{x} \right)^{4x}$$

- A.  $e^4$
- B. 4
- C.  $e^{12}$
- D. 12
- E.  $e^{3/4}$

9. The half life of a certain substance is 1000 years. How much of a sample weighing 100 kg remains after 100 years?

A. 10 kg

B.  $10 \ln(2)$  kg

C. 95 kg

D.  $\frac{100}{\sqrt[10]{2}}$  kg

E.  $10 \sqrt[10]{2}$  kg

10. If  $f(x) = \frac{x^2 + 3x - 4}{x^2 - 1}$  then  $f'(x) =$

A.  $\frac{-3x^2 - 10x - 3}{x^4 - 2x^2 + 1}$

B.  $\frac{-3}{x^2 - 2x + 1}$

C.  $\frac{2x + 3}{2x}$

D.  $\frac{9x^2 - 10x - 3}{x^4 - 2x^2 + 1}$

E.  $\frac{-3}{x^2 + 2x + 1}$

11. If  $f(x) = \log_{10}(x)$  then  $f'(e) =$

A. 1

B.  $\frac{1}{10}$

C.  $\frac{1}{e}$

D.  $\frac{1}{e \ln(10)}$

E.  $\frac{e}{10}$

12. If  $f(x) = (1 - x^2) \sin^{-1}(x)$  then  $f'(x) =$

A.  $\frac{-2x}{\sqrt{1 - x^2}}$

B.  $\sqrt{1 - x^2} - 2x \sin^{-1}(x)$

C.  $1 - 2x \sin^{-1}(x)$

D.  $-2x \cos^{-1}(x)$

E.  $\frac{1 - x^2}{1 + x^2} - 2x \sin^{-1}(x)$

13. If for differentiable functions  $f(x)$  and  $g(x)$  we have  $f(2) = 2$ ,  $f(3) = 5$ ,  $f'(2) = -3$ ,  $f'(3) = 7$  and  $g(2) = 3$ ,  $g(3) = 2$ ,  $g'(2) = -1$ ,  $g'(3) = -3$ , then

$$\left. \frac{d}{dx} f(g(x)) \right|_{x=2} =$$

- A. 3
- B.  $-7$
- C. 7
- D. 21
- E.  $-9$

**12.** A storage crate is to be built in the shape of a box with a square base. It is to have volume 10 cubic feet. The material for the base costs \$4 per square foot, the material for the lid costs \$1 per square foot, and the material for the sides costs \$2 per square foot. If  $a$  is the width of the crate and  $h$  is the height, what are the dimensions of the crate that minimizes the cost?

A.  $a = \sqrt{10}$  and  $h = 1$ .

B.  $a = \sqrt{2}$  and  $h = 5$

C.  $a = 2$  and  $h = \frac{5}{2}$

D.  $a = \sqrt{5}$  and  $h = 2$

E.  $a = 1$  and  $h = 10$