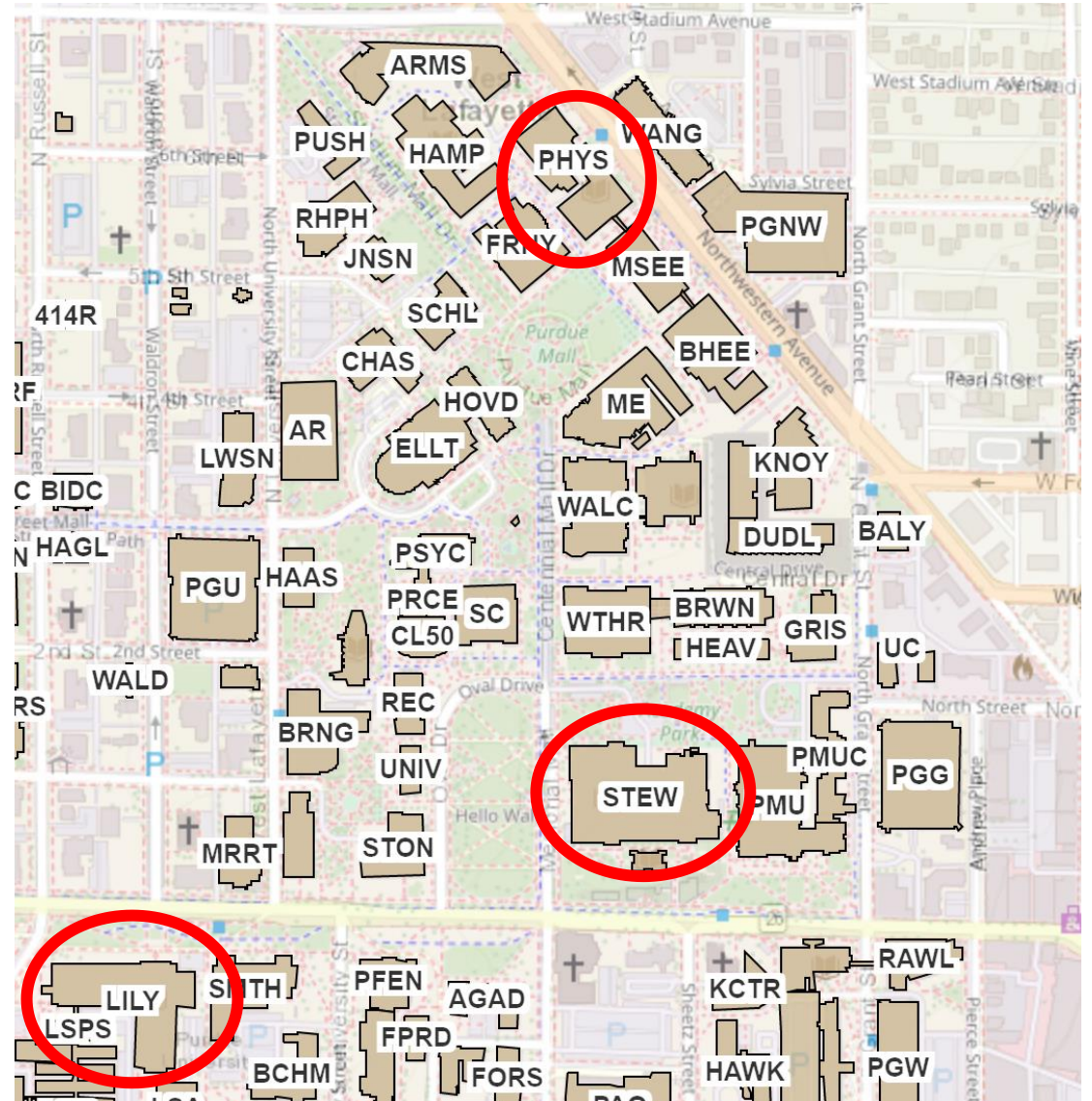# FINAL EXAM REVIEW

MA 16100·FALL 2022

DR. HOOD

1. WHEN/WHERE IS FINAL?

- Tuesday Dec 13

- 8:00-10:00am

- We will be in multiple rooms for this Exam
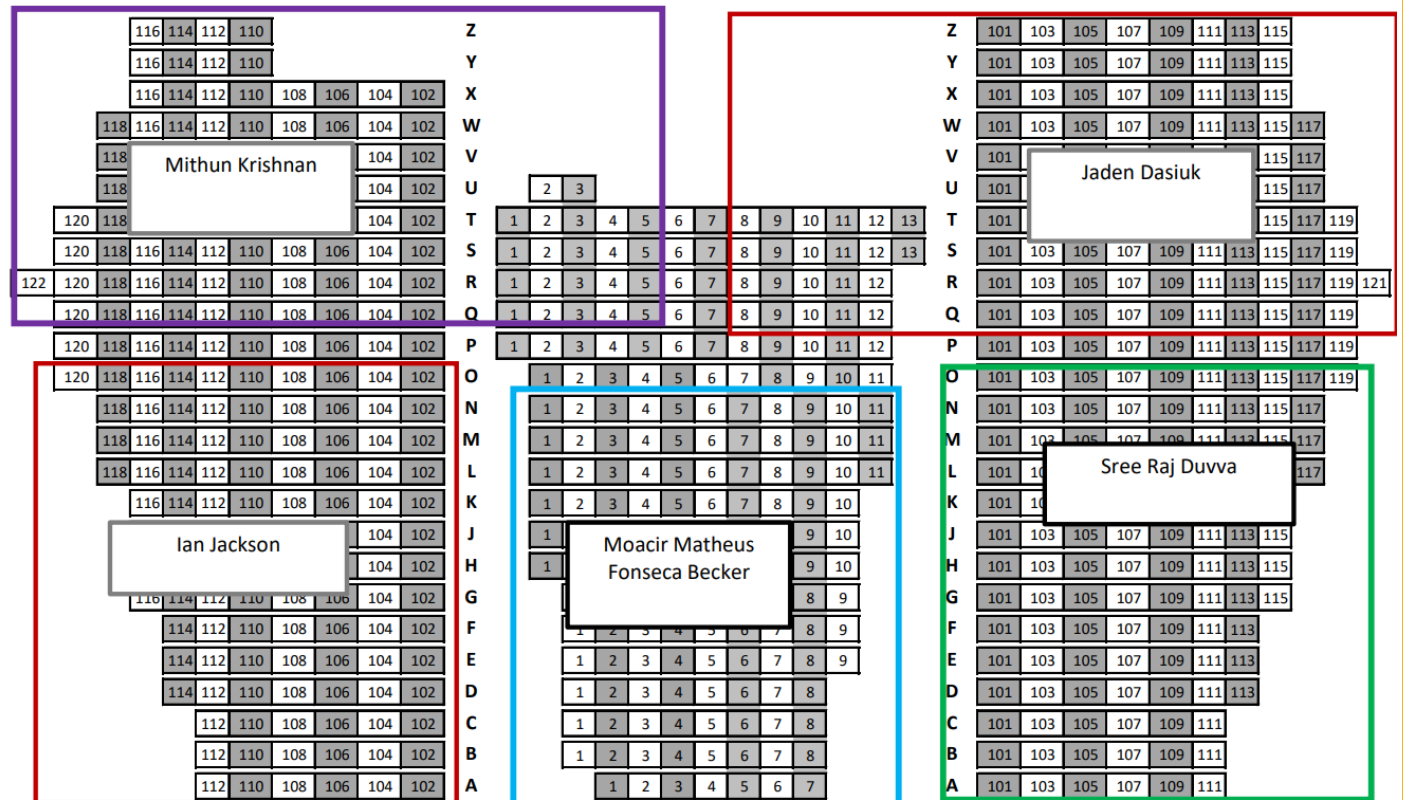 - STEW
  - LILY
  - PHYS

1.WHERE IS THE FINAL?

Loeb Playhouse (STEW 183)

Main Floor

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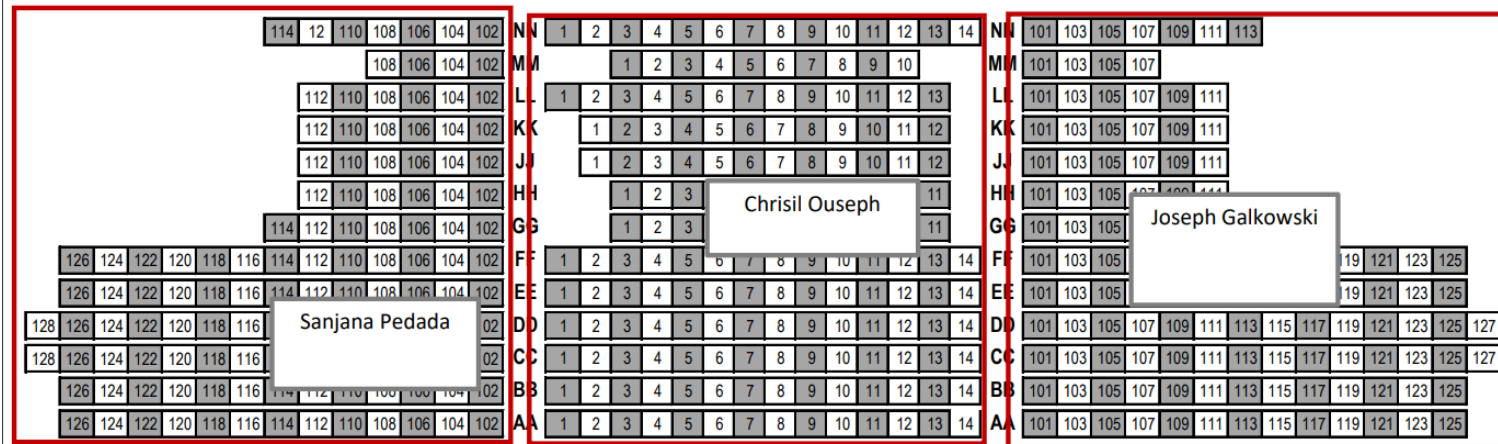 - Moacir Becker
  - Sree Duvva
  - Jaden Dasiuk

1.WHERE IS THE FINAL?

Loeb Playhouse (STEW 183)

Balcony

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

1.WHERE IS THE FINAL?

LILY 1105

- Grouped by TA:
  - Atharv Mudur
  - Hannah Linzy
  - Nicholas Villareal-Styles
  - Annie Giokas

1.WHERE IS THE FINAL?

PHYS 114

- Grouped by TA:
  - Tyler Dunaisky and Alex Hsu

1.WHERE IS THE FINAL?

PHYS 223

- Grouped by TA:
  - Krishna Thakkar

2. ASSIGNED SEATS

Students will be assigned seats.

(posted next week)

Your room and assigned seat will be posted in the Brightspace Gradebook.
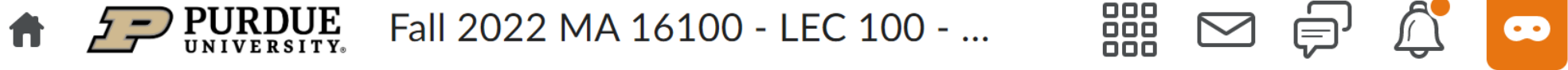
3. WHAT IS THE EXAM FORMAT?

- Face-to-face and multiple-choice
- 25 Questions worth 4 points each
  - Total = 25 x 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:

Questions from Exam 1	Questions from Exam 2	Questions from Exam 3	Questions 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

Scantron

Exam Booklet

5. HOW MANY VERSIONS?

- There will be 9 versions of the exam

- To be graded correctly, you need to fill out the Test Number on your Scantron:

6. RULES FOR ARRIVING LATE

Timer: Timer starts at 120 minutes and counts down	Late Arrivals: Can students who arrive to the exam late take the exam?	Leaving Early: 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. Approximate the area of the region bounded by the graph of $f(x) = 4x^2 + 1$ and the x-axis by dividing the interval $[0, 2]$ into $n = 4$ subintervals to find the left Riemann sum, L_4.

A. $\dfrac{38}{3}$

B. $\dfrac{25}{2}$

C. 17

D. 13

E. 9

2. Consider $f(x) = x^2 - 4\cos(x)$ on the domain $[0, 2\pi]$. The graph of $f(x)$ is concave **downward** on what interval(s)?

A. $\left(0, \dfrac{2\pi}{3}\right)$ and $\left(\dfrac{4\pi}{3}, 2\pi\right)$

B. $\left(\dfrac{2\pi}{3}, \dfrac{4\pi}{3}\right)$

C. $\left(0, \dfrac{\pi}{3}\right)$ and $\left(\dfrac{5\pi}{3}, 2\pi\right)$

D. $\left(\dfrac{\pi}{3}, \dfrac{5\pi}{3}\right)$

E. $\left(\dfrac{\pi}{3}, \dfrac{2\pi}{3}\right)$

3. Find the number c that satisfies the conclusion of the Mean Value Theorem for the function $f(x) = x + \dfrac{1}{x}$ on the interval $[1, 3]$.

A. $\sqrt{3}$

B. $\dfrac{3}{2}$

C. $\sqrt{2}$

D. $\dfrac{2}{\sqrt{3}}$

E. 1

4. Evaluate the limit:

$$\lim_{x \to 0}(1 + 3x)^{1/x}$$

A. e

B. $3e$

C. 3

D. 1

E. e^3

5. You are the owner of a rectangular orchard adjacent to a straight river. You have 600 feet of fence that you want to use to enclose it. No fencing is required along the river. If x is the length of a side perpendicular to the river and y is the length of the side parallel to the river, find the values of x and y that will maximize the enclosed area.

    A. $x = 300$ and $y = 300$

    B. $x = 150$ and $y = 300$

    C. $x = 100$ and $y = 400$

    D. $x = 150$ and $y = 450$

    E. $x = 200$ and $y = 200$

6. Consider the function $f(x) = xe^{-x}$. On what interval is $f(x)$ both decreasing and concave upward?

    A. $(-\infty, 2)$

    B. $(1, 2)$

    C. $(1, \infty)$

    D. $(2, \infty)$

    E. $(-\infty, 1)$

7. Evaluate the limit:

$$\lim_{x\to 0}\frac{1-\cos(2x)}{5x^3+4x^2}$$

A. $\dfrac{1}{8}$

B. $\dfrac{1}{2}$

C. $\dfrac{1}{4}$

D. $\dfrac{2}{15}$

E. $-\dfrac{1}{30}$

8. Use linear approximation to estimate $\sqrt{99.8}$.

    A. 9.99

    B. 9.98

    C. 9.998

    D. 9.9

    E. 9.8

9. A certain function $f(x)$ has the following first derivative: $f'(x) = x^2(x-4)(x-2)(x+2)^2$. How many local **minima** does $f(x)$ have?

A. 1

B. 4

C. 3

D. 2

E. 0

10. For the function $f(x) = 8x + \dfrac{6}{x^2}$, let $F(x)$ be the antiderivative that satisfies $F(1) = 1$. Find $F(2)$.

   A. 10
   B. 22
   C. 32
   D. 14
   E. 16

11. Consider the function $f(x) = \dfrac{x^6}{30} - \dfrac{x^4}{12}$. How many inflection points does $f(x)$ have?

A. 2

B. 0

C. 4

D. 1

E. 3

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 the 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 $h = 10$