

## Quiz 5 Outline

**Format.** This quiz has **3 multiple-choice** questions and **1 free-response** question.

1. (2 points) Compute the volume of a solid using cylindrical shells.

**Example:** Which of the following integrals represents the volume of the solid of revolution formed by rotating the region bounded by the  $x$ -axis and  $f(x) = x - x^2$  around the  $y$ -axis using the cylindrical shells method?

- A.  $\int_0^1 \pi(x - x^2)^2 dx$   
B.  $\int_0^1 2\pi(x - x^2) dx$   
C.  $\int_0^1 2\pi x(x - x^2) dx$   
D.  $\int_0^1 \pi x^2(x - x^2) dx$

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2. (2 points) Work problem involving a cable.

**Example:** A 60 foot rope weighing 8 lb. per foot is used for mooring a cruise ship. It hangs freely over the side of the ship. Choose the integral that computes how much work is done in winding in the rope.

- A.  $\int_0^{60} (60 - 8x) dx$   
B.  $\int_{-60}^0 8(60 - x) dx$   
C.  $\int_0^{60} (8x - 60) dx$   
D.  $\int_0^{60} 8(60 - x) dx$   
E.  $\int_{-60}^0 8x dx$

*Spring 2023 Final Exam #4*

3. (2 points) Compute the center of mass of a region.

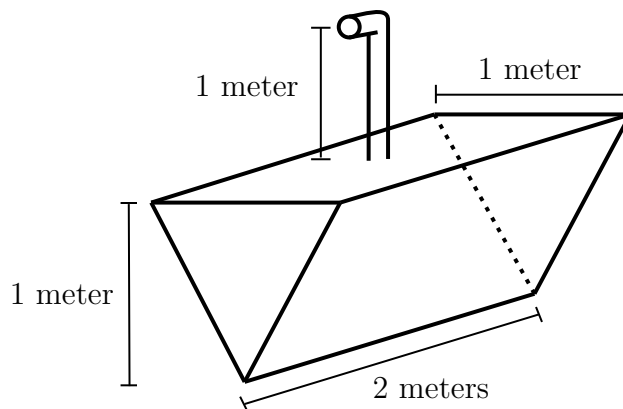
**Example:** Consider the region  $R$  bounded by the curves  $y = \sin x$ ,  $y = 0$  with  $0 \leq x \leq \pi$ . What is the centroid of the region  $R$ ?

- A.  $(\pi/2, \pi/4)$   
B.  $(\pi/2, \pi/8)$   
C.  $(\pi, \pi/8)$   
D.  $(\pi, \pi/4)$

*Fall 2022 Exam 2 #2a*

4. (4 points) Work problem involving a tank.

**Example** The tank shown below is full of water. Set up an integral to evaluate the work required to pump all of the water out of the tank through the spout. You may assume that the mass density of water is  $1000 \frac{\text{kg}}{\text{m}^3}$  and that the acceleration due to gravity is  $9.8 \frac{\text{m}}{\text{sec}^2}$ . **You do not need to evaluate the integral.**



## **Solutions**

All problems listed come from previous midterms; complete solution keys are posted on Canvas.