Good afternoon: no warm up, we'll randomize when the bell rings

Next test: Tuesday

visibly random grouping

HW answers, even (use calcchat for odds)

t.b.d.

Test skills:

- I-U1: Riemann Definition of Definite Integral
- I-U2: Using the Riemann Definition
- I-U3a: LRAM/RRAM
- I-U3b: MRAM/TRAP
- I-U3c: Riemann from a table (could be any of the 4 approx.)
- I-U5: FTC2 for Definite Integration
- I-A3: Finding C

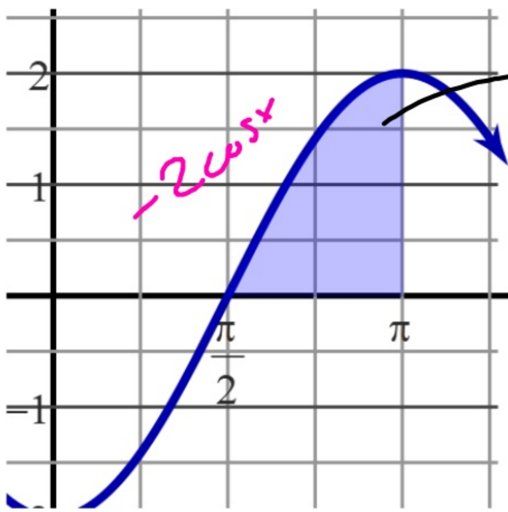
1 more topic we didn't get to cover before

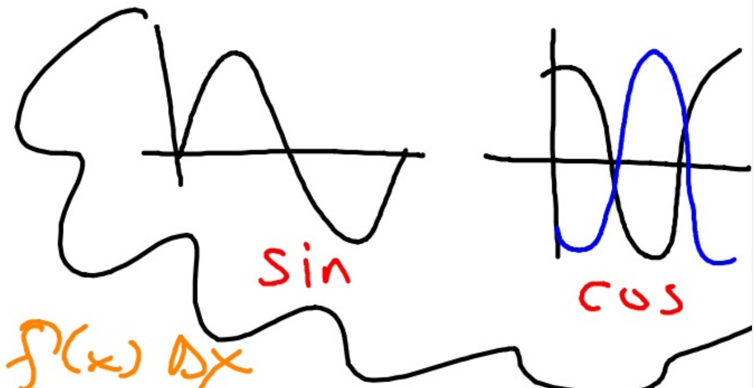
$$\int_a^b f'(x)\,dx = f(b) - f(a)$$

$$\int_a^b v(t)\,dt = x(b) - x(a)$$

Find the exact area

$$y = -2\cos x; \quad \left[\frac{\pi}{2}, \pi\right]$$





$f(x)\ \Delta x$

$$\int_{\frac{\pi}{2}}^{\pi} -2\cos x \; dx$$

Antiderivati

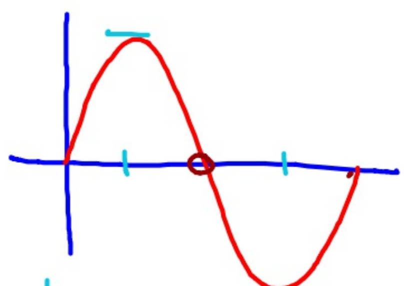
$$= \left[-2\sin(x)\right]_{\pi/2}^{\pi}$$

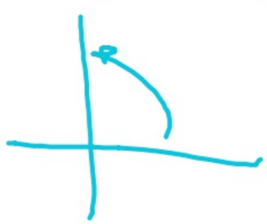
$$\left(\cancel{-2\sin(\pi)}\right) - \left(-2\sin(\pi/2)\right)$$

$$(0) - \left(\cancel{-2(1)} \quad \right)$$

$$-2$$

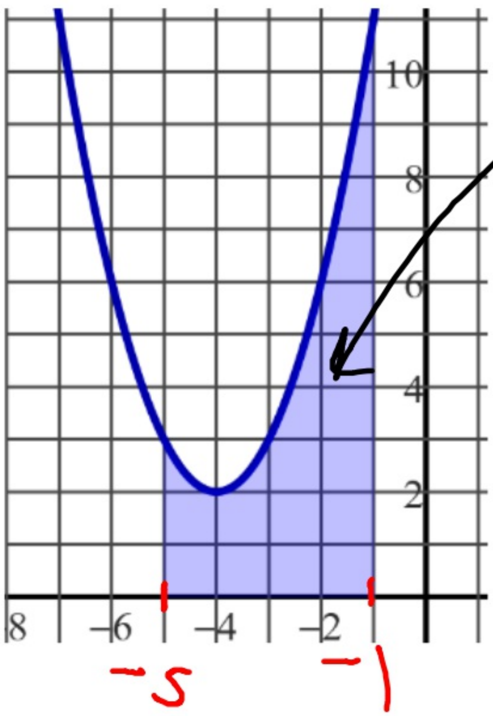
$$\boxed{2}$$





Find the exact area of the region

$y = x^2 + 8x + 18$



$$\int_{-5}^{-1} x^2+8x+18\,dx$$

$$\left[\frac{1}{3}x^3+4x^2+18x\right]_{-5}^{-1}$$

$$\left(-\frac{1}{3}+\cancel{4-18}\right) - \left(\frac{-125}{3}+\cancel{100-90}\right)$$

$$-14 \qquad 10$$

$$-\frac{1}{3} - 14 + \frac{125}{3} - 10$$

$$\frac{124}{3} - 24 \longrightarrow 41\tfrac{1}{3} - 24 = \boxed{17\tfrac{1}{3}}$$

Examples of each (pre-practice assessment)

I-U1

Area of 1 rect.

subint. width

base rect.

Interval width

sub intervals

1. The Riemann definition of the definite integral is given by

$$\lim_{n\to\infty}\sum_{i=1}^{n}\underbrace{f(x_i)}_{\text{height}}\Delta x=\int_a^b f(x)\,dx$$

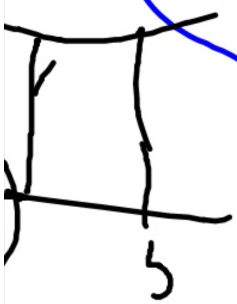
where $\Delta x=\frac{b-a}{n}$. Explain why this is so in the context of area under a curve. You may use diagrams to accompany your explanation.

exact area

To find area, divide the region into rectangles. Improve this approximation w/ ∞-many, ∞-thin rectangles.

Sum of "n" rectangles' area.

So from finite n (approx. area) to ∞ n, or exact area.



I-U2

Write a definite integral whose value equals

$$\lim_{n\to\infty}\sum_{i=1}^{n} 3\boxed{\left(5+\frac{8i}{n}\right)}^{2}\frac{8}{n}$$

$8 \leftarrow b-a$

x $\qquad$ Δx

a

$$\int_{5}^{13} 3x^{2}\,dx$$

$$\int_{\_}^{\_} \square \; dx$$

Rewrite as an inf. Riemann sum

$$\int_{-2}^{4} \cos(\cancel{x}^{2})dx$$

$$\lim_{n\to\infty}\sum_{i=1}^{n} \cos\left(\left(-2+\frac{6}{n}i\right)^{2}\right)\frac{6}{n}$$

$x = a + \Delta x \cdot i$

Find the ~~LRAM~~ and RRAM for $\int_{-2}^{0} 5-x^2\,dx$ with n=4

Classify each as an over or underestimate and explain.

f is inc.

$$\Delta x = \frac{2}{4} = \frac{1}{2}$$

x	-2	-1.5	-1	-0.5	0
f(x)		2.75	4	4.75	5

$$(2.75)(0.5) + (4)(0.5) + (4.75)(0.5) + 5(0.5)$$

Approximate $\int_{-3}^{1} e^{-x}\,dx$ using n=4 trapezoids.

Approximate the integral using the table and a right-sum.

$$\int_0^{10} f(x)\,dx$$

x	0	1	6	7	10
$f(x)$	3	4	6	5	7

Evaluate each

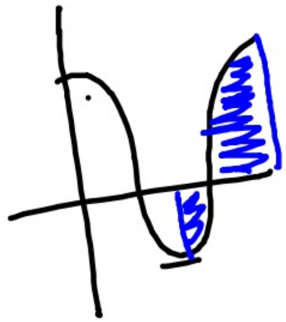
$$\int_{-4}^{1} 2x - 3x^2 \, dx$$

$$\left[x^2 - x^3 \right]_{-4}^{1}$$

$$(1 - 1) - (\cancel{16 + 64})$$

$$80$$

$$0 - 80 = -80$$



$$\int_{\pi}^{2\pi} -\sin\theta \, d\theta$$

$$\cos\theta \Big]_{\pi}^{2\pi}$$

$$\cos 2\pi - \cos\pi$$

$$1 - -1$$

$$1 + 1 = 2$$

An object moves subject to $a(t)=t^2+1$. If its intial position is 4 and its velocity at $t=1$ is 10/3, find the position at $t=1$.

$\int_{12}^{-10} f(x)\,dx = 6$, $\int_{100}^{-10} f(x)\,dx = -2$, and $\int_{100}^{-5} f(x)\,dx = 4$ determine the value of $\int_{-5}^{12} f(x)\,dx$.

Practice Assessment

test: Tuesday