30/30

Tecnológico de Monterrey Preparatoria

## Activity 3.5: Areas and properties to Evaluate Definite Integrals

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### Approximate the area of a plane regions using left hand and right hand approximations

1. $f(x)=9-x^2$ on $[1,3]$ 4 rectangles

$\frac{3-1}{4}$ = .5

| x | f(x) | Δx | Area |
|---|---|---|---|
| 1 | 8 | .5 | 4 |
| 1.5 | 6.75 | .5 | 3.375 |
| 2 | 5 | .5 | 2.5 |
| 2.5 | 2.75 | .5 | 1.375 |
| 3 | 0 | .5 | 0 |

LH: 11.25u²
RH: 7.25u²
Middle: 8u²

2. $f(x)=2^x$ on $[-1,2]$ 6 rectangles

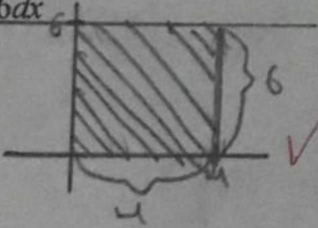
LH: f(-1)(.5) + f(-.5)(.5) + f(0)(.5) + f(.5)(.5) + f(1)(.5) + f(1.5)(.5) = 4.22u²

RH: f(-.5)(.5) + f(0)(.5) + f(.5)(.5) + f(1)(.5) + f(1.5)(.5) + f(2)(.5) = 5.97u²

Middle: f(-.75)(.5) + f(-.25)(.5) + f(.25)(.5) + f(.75)(.5) + f(1.25)(.5) + f(1.75)(.5) = 5.02u²

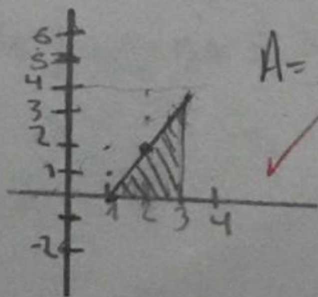
### Give the graph of the region corresponding to the given definite integral and evaluate the integral using geometric formulas

3. $\int_0^4 6\,dx$



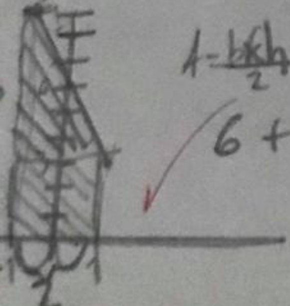
A: b×h = 24u²

4. $\int_1^3 (2x-2)\,dx$



A = $\frac{b \times h}{2} = \frac{2(4)}{2}$ = 4u²

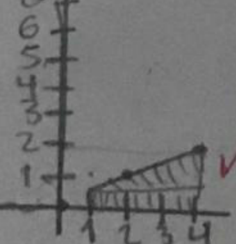
5. $\int_{-1}^1 (6-3x)\,dx$



A = $\frac{b \times h}{2} = \frac{6(2)}{2}$ = 12u²

6 + 3(2)

6. $\int_1^4 \frac{x}{2}\,dx$

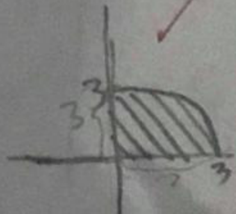


A = $\frac{b \times h}{2}$ + b×h = $\frac{1.5(3)}{2}$ + .5×3 = 3.75u²

7. $\int_0^3 \sqrt{9-x^2}\,dx$

y² = 9 − x²

y + x² = 3



A = $\frac{\pi r^2}{4}$ = A = $\frac{\pi 9}{4}$

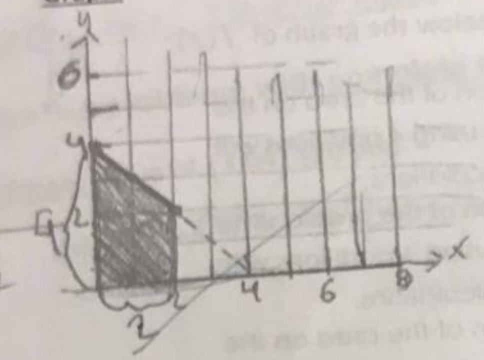
A = $\frac{9\pi}{4}$ u²

1. ( ) Having J

2) Give **the graph (remember to shade the corresponding area)** whose area is given by the following definite integral. Then use a **geometric formula** to **evaluate the integral** (by finding the area) **(15 points each)**

$\int_0^2 (4-x)\,dx$

**Graph**



**Procedure by geometric formulas**

$A = \frac{b\times h}{2} + l\times l = \frac{2(2)}{2} + 2(2) = 2+4 = \boxed{6u^2}$

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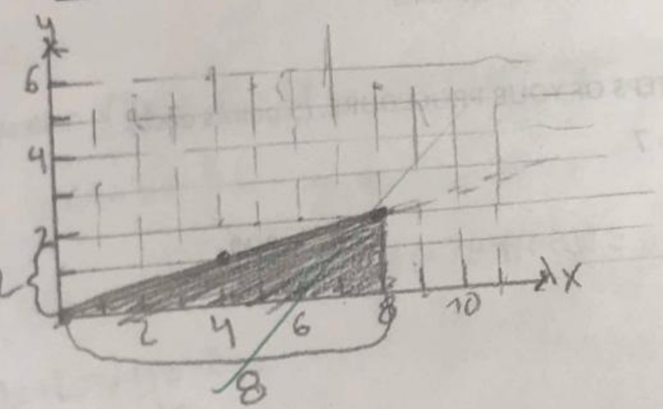
11

3) $\int_0^8 \frac{x}{4}\,dx$

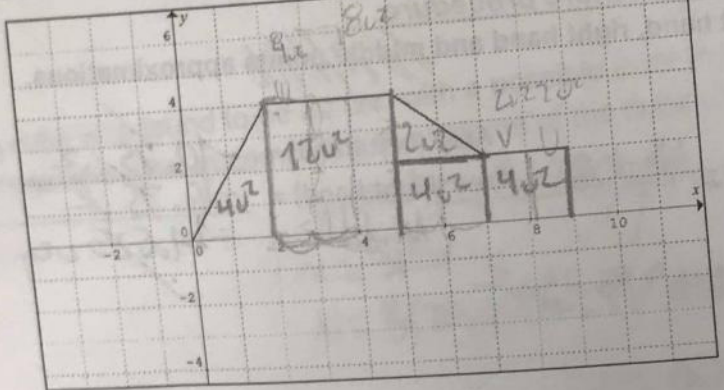
**Graph**



**Procedure by geometric formulas**

$A = \frac{b\times h}{2} = \frac{8(2)}{2} = \boxed{8u^2}$

3) **Based on the following graph evaluate the given definite integrals (5 points each):**




1. $\int_0^3 f(x)\,dx$ $4+4=\boxed{8u^2}$

2: $\int_4^2 f(x)\,dx$ $\boxed{-8\,u^2}$

3. $\int_5^7 f(x)\,dx$ $2+4=\boxed{6u^2}$

4. $\int_0^8 f(x)\,dx$ $4+12+2+4+2=\boxed{24u^2}$