Quiz

Directions: Carefully read each question below and answer to the best of your ability in the space provided. You **MUST** show your work to receive full credit!

1. (5 points) Given the constraint equation $6x + 2y = 36$, determine the maximum value for the product $A = xy$. (*Hint*: Begin by writing $A = xy$ as an equation in terms of x only.)

Solution: Solving the constrain equation for y yields:

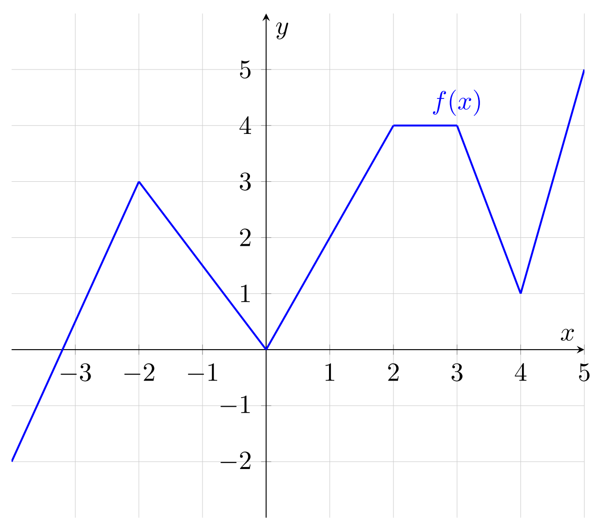
$$2y = 36 - 6x \quad \Longrightarrow \quad y = 18 - 3x.$$

Substituting this expression for y into the equation for A gives:

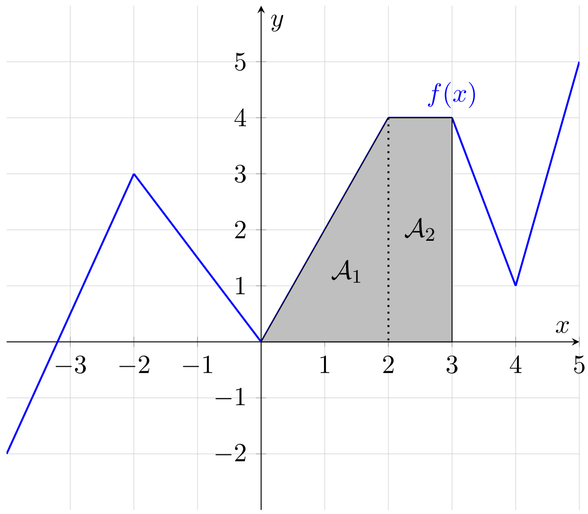
$$A(x) = x(18 - 3x) = 18x - 3x^2.$$

Now, to determine the maximal value for A, we need to determine the optimal x value by determine the critical points of the above equation. Thus, since $A'(x) = 18 - 6x$, setting the derivative equal to zero and solving for x gives $18 - 6x = 0 \Longrightarrow x = 3$. Thus, the optimal value for A is given by $A(3) = 18(3) - 3(3)^2 = \boxed{27}$.

2. (5 points) Given the graph $y = f(x)$ below, compute the integral $\int_0^3 f(x)dx$ using geometry.



Solution:



The region between the x-axis and the function $f(x)$ forms a triangle of with a base of length 2 and a height of length 4 (from the x values of 0 to 2) and a rectangle with a base of length 1 and height of length 4. Therefore,

$$\int_0^3 f(x)dx = \mathcal{A}_1 + \mathcal{A}_2 = \frac{1}{2}(2)(4) + (1)(4) = 8$$

Name: ____

Section (circle one): 021 022 023 024

Question:	1	2	Total
Points:	5	5	10
Score:			