Problem Set #4

Due Friday, October 23, 2026 @ 12:30 pm
Submit as single pdf file to Canvas

Remember that you need to explain and show the steps in your answers!

1. Let $h(x) = x\sqrt[3]{9 - x^2}$

   (a) What are the critical numbers of $h(x)$? *(Hint: There are four.)*

   (b) Find the maximum and minimum values that $h(x)$ obtains on the interval $[0, 4]$. Be sure to specify the x-values that determine the max and min.

2. Find the point on the portion of the parabola $y = x^2 - 8x + 18$ with $3 \leq x \leq 6$ that is closest to the origin.

3. Let $f(x) = 2xe^x + x^2e^x$

   (a) Find one antiderivative $F(x)$ of $f(x)$. *(Hint: Think of undoing the product rule.)*

   (b) Demonstrate that your answer to part (a) is correct by showing that $F'(x) = f(x)$.

   (c) What is the form of *every* antiderivative of $f(x)$? Why?

4. Let $g(x) = x^5 - 3x^3$. Find the critical numbers of $g(x)$ and use the First Derivative Test to classify each as a local max, local min, or neither.