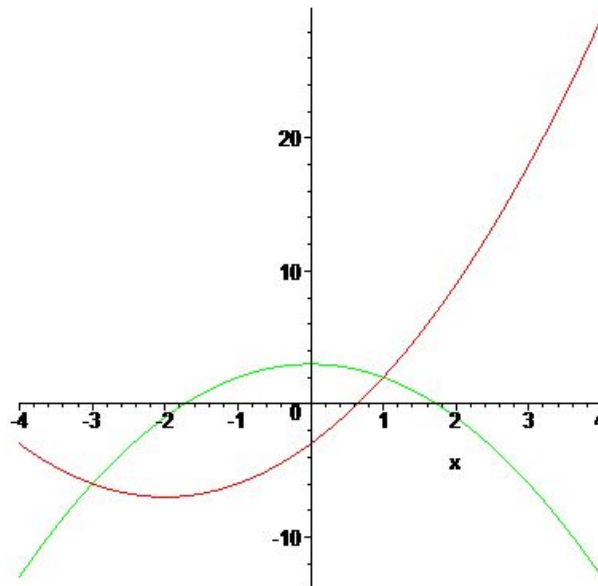Quiz # 07
Math 101 Section 03 Calculus I
27 November 2024 Wednesday
Instructor: Ali Sinan Sertöz
Solution Key

Bilkent University

Q-1) Find the area between the curves $y = x^2 + 4x - 3$ and $y = 3 - x^2$ on the interval $[-4, 4]$.

Grading: 10 points

Solution: Grader: `gunes.akbas@bilkent.edu.tr`

Set $f(x) = x^2 + 4x - 3$ and $g(x) = 3 - x^2$.

The intersection points are found by solving $f(x) = g(x)$. This gives $2x^2 + 4x - 6 = 0$ and hence $x = -3$ and $x = 1$.

The required area is then found as follows.

$$
\begin{aligned}
Volume &= \int_{-4}^{-3} [f(x) - g(x)]\, dx + \int_{-3}^{1} [g(x) - f(x)]\, dx + \int_{1}^{4} [f(x) - g(x)]\, dx \\
&= \left(\frac{2}{3}x^3 + 2x^2 - 6x \Big|_{-4}^{-3} \right) + \left(6x - 2x^2 - \frac{2}{3}x^2 \Big|_{-3}^{1} \right) + \left(\frac{2}{3}x^3 + 2x^2 - 6x \Big|_{1}^{4} \right) \\
&= \frac{14}{3} + \frac{64}{3} + 54 \\
&= 80.
\end{aligned}
$$