Exam rules: No electronic devices of any kind are allowed during this exam. You may use one 2-sided US Letter sized page of notes, but no books or other assistance are allowed during this exam. If you violate these instructions or communicate in any way with any other student during this exam, you will receive a zero on the exam, and the zero will not be dropped when calculating your cumulative course average.

Instructions: Write your solutions clearly and legibly and show all of your work. No credit will be given for unsupported or illegible solutions. Please put a box around your answer to each part. If any question is not clear, ask for clarification.
1. Consider the following curves and their graphs:

\[ y = x^2 - 6x + 9 \quad \text{and} \quad y = x - 1 \]

(a) Find the area of the region enclosed by the two curves.
(b) Find the *volume* of the solid obtained by revolving the region in part (a) about the $x$-axis.
2. (a) Rewrite the following integral using the appropriate trigonometric substitution:

\[ \int 2x^5 \sqrt{x^2 - 25} \, dx \]

(Your answer will be a trigonometric integral.)

(b) Evaluate the trigonometric integral you found in part (a).
(c) Evaluate the integral given in part (a) in terms of \( x \) using the answer to part (b) and the substitution you chose in part (a). (That is, “re-substitute” to solve the antiderivative.)
3. (a) Find the partial fraction decomposition of the following rational function:

\[
\frac{3x^2 - 11x + 7}{(x - 3)(x - 2)^2}
\]
(b) Evaluate its antiderivative:

$$\int \frac{3x^2 - 11x + 7}{(x - 3)(x - 2)^2} \, dx$$
4. Determine if the given improper integral converges or diverges. If it converges, find its value.

\[
\int_0^\infty \frac{x \, dx}{(x^2 + 2)^3}
\]