1. *(6 points)* Evaluate $\int (4x + 2) \sin(2x) \, dx$ via integration by parts.

2. *(6 points)* Set up an evaluatable integral whose value is the volume of the solid produced by rotating the region bounded by $y = x^3 - 7x^2 + 14x - 5$ and $y = 3$ around the $y$-axis. It is not necessary to evaluate the integral.
3. (6 points) Evaluate the trig-substitution integral \( \int \frac{x^3}{\sqrt{x^2-4}} \, dx \)

4. (6 points) Using partial fraction decomposition, evaluate the integral \( \int \frac{2x+1}{x^2+6x+9} \, dx \).

5. (2 point bonus) Evaluate the integral \( \int \frac{e^{3t}}{e^t - e^{-t}} \, dt \).