PRACTICE FOR MIDTERM 2

Problem 1. Compute the complex number $\left(\frac{\sqrt{3}+i}{1+i}\right)^3$. Express your answer in polar coordinates $(r, \theta)$ or as $re^{i\theta}$.

Problem 2. Find the antiderivative
$$\int \sin^7(x)\cos^3(x)dx.$$ 

Problem 3. Use trig substitution to find the antiderivative
$$\int \frac{x^2}{\sqrt{9-x^2}}dx.$$ 

Problem 4. Use partial fractions to calculate the antiderivative
$$\int \frac{x-1}{x(x^2+3)}dx.$$ 

Problem 5. (a) Does
$$\int_0^\infty \frac{1}{x^2+3x+2}dx$$ converge or diverge? Justify your answer.
(b) Evaluate the improper integral
$$\int_0^{\pi/2} \tan(x)dx.$$