PRACTICE PROBLEMS FOR THE MIDTERM

1. Give three reasons why one should not cheat on a take home exam.
2. If you ask Wolfram Alpha to find and compute the residues of
$$\frac{\log z}{(z^2+1)(z+1)}$$
to solve question 3 of homework 3, why will it give you the wrong answer?
3. Calculate
$$\int_0^{2\pi} \frac{\mathrm{d}\theta}{(\cos\theta)^2 + (\cos\theta)^{-2}}.$$
4. Calculate
$$\int_0^{2\pi} e^{\cos\theta} \cos(n\theta - \sin n\theta)\,\mathrm{d}\theta$$
5. Calculate
$$\int_0^{\infty} \frac{x^{1/2}\log x}{1+x^2}\,\mathrm{d}x \qquad \text{and} \qquad \int_0^{\infty} \frac{x^{1/2}}{1+x^2}\,\mathrm{d}x.$$