Resolve each integral below using a trig substitution. You *must* clearly and neatly show your work to get credit. Give an *exact*, unapproximated decimal, value for the definite integral.

1. $\displaystyle \int \frac{dx}{x\sqrt{4+x^2}}$

2. $\displaystyle \int_1^2 \frac{\sqrt{4-x^2}}{x^2}\,dx$

Use polynomial division to write the improper rational function as the sum of a polynomial and proper rational function, then intergrate.

3. $\displaystyle \int \frac{3x^3 - 8x^2 + 5x - 3}{x-2}\,dx$

Some possibly useful identities

*You will **need** to know these and other identities for the exam*

- $1 + \cot^2 \theta = \csc^2 \theta$

- $1 + \tan^2 \theta = \sec^2 \theta$

- $\displaystyle\int \sec \theta \; d\theta = \ln|\sec \theta + \tan \theta| + C$

- $\displaystyle\int \csc \theta \; d\theta = -\ln|\csc \theta + \cot \theta| + C$

- $\displaystyle\int \tan \theta \; d\theta = \ln|\sec \theta| + C$

- $\displaystyle\int \cot \theta \; d\theta = -\ln|\csc \theta| + C$