Advanced Placement Calculus   Name _____

Copy original problem.   Per _____   Date _____

Convince *me* that **you** understand the concept*!*

Calculators may be used on **Ia** *and* **Id** *ONLY!*

Chapter 9 Exam

I   Given: $\displaystyle\int_{2}^{2\sqrt{3}} \frac{x^2\,dx}{\sqrt{16-x^2}}$ (40 pts tot)

    a) Compute the value of the given integral with your calculator.

    b) In the original, make the substitution $x = 4\sin\theta$ (including the change in limits) then integrate and evaluate.

    c) In the original, make the substitution $u = \sqrt{16-x^2}$ ..... then integrate and evaluate.

    d) Reconcile the three **answers** above.

II   Integrate $\displaystyle\int \cos^2\theta\,d\theta$ using "Parts"   (20 pts)

III   Given: $\displaystyle\int \frac{dx}{2+\tan x}$.   You, no doubt, have noticed that the desired $\sec^2 x$ is not included.   (40 pts tot)

    a) Convert the fraction, $\dfrac{1}{2+\tan x}$ into a single, proper fraction involving sine and cosine.

    b) Briefly explain why you still do not have the desired $\dfrac{du}{u}$ situation.

    c) Let $\tan x = y$. Rewrite the original in terms of y.

    d) Rewrite your answer to "c" as two integrals with proper numerators.

    e) Integrate your answer to part "d".

    f) Show that your answer is equivalent to: $\dfrac{1}{5}\left(\ln\left|\dfrac{2+\tan x}{\sec x}\right| + 2x\right) + c$

Extra Credit ---------------------------------- **5 pts** ---

    Given: $\displaystyle\int \cot x \csc^2 x\ dx$

    Jake said, "I use $u = \cot x$." Jed said "I use $u = \csc x$". Both integrate their problems (and got different answers, of course.) Resolve the dilemma and explain. Be *very* specific. I'm not interested in generalities.