

Advanced Placement Calculus

Name _____

Copy original problem.

Per _____

Date _____

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

Chapter 9 Exam

I Given: $\int_2^{2\sqrt{3}} \frac{x^2 dx}{\sqrt{16-x^2}}$ (40 pts tot)

- Compute the value of the given integral with your calculator.
- In the original, make the substitution $x = 4 \sin \theta$ (including the change in limits) then integrate and evaluate.
- In the original, make the substitution $u = \sqrt{16-x^2}$,,,, then integrate and evaluate.
- Reconcile the three answers above.

II Integrate $\int \cos^2 \theta d\theta$ using “Parts” (20 pts)

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

- Convert the fraction, $\frac{1}{2 + \tan x}$ into a single, proper fraction involving sine and cosine.
- Briefly explain why you still do not have the desired $\frac{du}{u}$ situation.
- Let $\tan x = y$. Rewrite the original in terms of y .
- Rewrite your answer to “c” as two integrals with proper numerators.
- Integrate your answer to part “d”.
- Show that your answer is equivalent to: $\frac{1}{5} \left(\ln \left| \frac{2 + \tan x}{\sec x} \right| + 2x \right) + c$

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

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

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.