

*Follow these instructions carefully:*

Work on the paper provided; do not use your own paper. *Work only on one problem on each sheet (you should not work on two different problems on the two sides of the same sheet).* On the top of each page, *print* your name (*encircle your last name*) and indicate the number of the problem you are working on by writing e.g. “*Problem #4*”. Always *encircle* your final answer. If there are several parts to a problem, always indicate the part that you are answering, e.g. by writing “*Answer to Part b*” (the number of the problem should be on the top of the page). Do not use a *red* pen or a *red* pencil. Do not write in the corner covered up by the staple (top left corner on the front side, top right corner on the back side). Each problem is worth the *same* amount of credit. **Show all your work.**

1. *a)* Find the exact value of  $\operatorname{arcsec}(-2)$  (no calculator should be used for this, since a calculator can only give approximate answers).

*b)* Find  $\tan(\arcsin x)$ .

*c)* Calculate the derivative of  $x \arctan x$ .

2. Set up the integrals to do the following calculations. *Do not calculate any of the integrals.* Always integrate along the  $x$ -axis. For each of the parts, consider the region bounded by the curves  $y = x^2 - 7x + 13$  and  $y = 8 - x$ .

*a)* To find the area of the above region.

*b)* To find the volume obtained by rotating the above region about the  $x$ -axis.

*c)* To find the the volume obtained by rotating the above region about the  $y$  axis.

3. Calculate the integrals

*a)*  $\int_0^{\pi/2} x^2 \cos x \, dx,$

*b)*  $\int_0^{\pi/4} \tan^5 x \sec^2 x \, dx.$

4. Calculate the integral

$$\int \frac{1}{x^2 \sqrt{x^2 - 1}} \, dx.$$

5. Calculate the integral

$$\int_0^1 \frac{2x^4 + 5x^2 + 1}{(x + 1)(x^2 + 1)^2} \, dx.$$