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.

1. a) Find the exact value of arcsec(−2) (no calculator should be used for this, since a calculator can only give approximate answers).

   b) Find tan(arsin 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.** For each of the parts, consider the region bounded by the curves $y = x^2 - 4x + 5$ and $y = x + 1$.

   a) To find the area of the above region.

   b) To find the volume obtained by rotating the above region about the $x$ axis by using the method of slices (also called the method of disks, washers, or cross sections).

   c) To find the the volume obtained by rotating the above region about the $y$ axis by using the method of cylindrical shells.

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

   $$\int \frac{x - 5}{x^4 + 4x^3 + 5x^2} \, dx.$$