

Math 14  
Winter 2009  
Monday, January 5

Day 1 Homework

These problems should be review of material you learned in Math 8.

Our first quiz, on Friday, will consist of problems taken from this homework, with the details (the specific numbers and functions) changed. If you know how to do these problems you should get 100% on the quiz.

1. Find the vector projection of the vector  $\vec{b} = (4, 1, 2)$  onto the vector  $\vec{a} = (1, 1, -1)$ .
2. Find the area of the triangle with vertices  $(0, 0, 0)$ ,  $(0, 1, 1)$ , and  $(1, 2, 0)$ .
3. Find an equation for the plane containing points  $(1, 1, 1)$ ,  $(1, 2, 2)$ , and  $(2, 3, 1)$ .
4. The function  $\vec{r}(t) = (2t^2, 3, t^3)$  parametrizes a curve in  $\mathbb{R}^3$ .
  - (a) Find the arclength of the portion of the curve between  $(0, 3, 0)$  and  $(2, 3, 1)$ .
  - (b) If  $\vec{r}(t)$  represents the position of a moving object at time  $t$ , find the object's position, velocity, and acceleration at  $t = 1$ .
  - (c) Find the function giving the position at time  $t$  of an object moving with constant velocity, that has the same position and velocity as our given object at time  $t = 1$ .
5. Give the tangent plane approximation to the function  $f(x, y) = x_2 - y^2$  at the point  $(x, y) = (1, 2)$ . (The tangent plane approximation is a function of the form  $g(x, y) = ax + by + c$ , which has the same value and the same partial derivatives as  $f$  at the given point.)