

**Activity 3:** Looking back on 1.7, looking forward to 1.8

Names: \_\_\_\_\_ Date: September 24, 2009 Score: \_\_\_\_\_

Show your work or explain your answer for each of the following. You should submit one copy for your group. Feel free to ask your instructor for advice if you need it.

1. (7 pts) Let  $\mathbf{a}$ ,  $\mathbf{b}$ , and  $\mathbf{c}$  be vectors in  $\mathbf{R}^3$ . Which of the following make sense? Which are nonsense?

(a)  $(\mathbf{a} \cdot \mathbf{b}) \times \mathbf{c}$

(b)  $(\mathbf{a} \times \mathbf{b}) \cdot \mathbf{c}$

(c)  $(\mathbf{a} \cdot \mathbf{b})\mathbf{c}$

(d)  $\frac{\mathbf{c}}{\mathbf{a} \cdot \mathbf{b}}$

(e)  $\frac{\mathbf{a} \cdot \mathbf{b}}{\mathbf{c}}$

(f)  $(\mathbf{a} \times \mathbf{b}) + \mathbf{c}$

(g)  $\mathbf{a} \cdot \mathbf{b} + \mathbf{c}$

2. (2 pts) Describe all vectors perpendicular to the vectors  $\mathbf{a} = (1, 2, 3)$  and  $\mathbf{b} = (1, -2, 3)$ .

3. (2 pts) Describe all vectors perpendicular to the vectors  $\mathbf{a} = (1, 2, 3)$  and  $\mathbf{b} = (-1, -2, -3)$ . You can give your answer in the form of an equation which the components  $(x, y, z)$  of the vector must satisfy.

4. (3 pts) Find the projection of the vector  $\mathbf{a} = (2, 3, 4)$  onto the vector  $\mathbf{b} = (-1, 0, 2)$ .
5. (3 pts) Find the area of the triangle with vertices  $(1, 2, 3)$ ,  $(1, 3, 4)$ , and  $(-1, 2, 3)$ .
6. (3 pts) The points  $(1, 2, 3)$ ,  $(1, 3, 4)$ , and  $(-1, 2, 3)$  determine a plane. Find a vector perpendicular to that plane.