

## Chapter 7 Review Extra Practice

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- Solve the triangles determined by the points  $A$ ,  $B$ , and  $C$  below. (Determine all side lengths and angle measures for  $\triangle ABC$ .) Calculate all inexact answers to two decimal places accuracy.
  - $A(1, -1, 3)$ ,  $B(2, 7, -3)$ ,  $C(-1, 2, 6)$
  - $A(5, 1, -2)$ ,  $B(3, -2, 2)$ ,  $C(1, -2, 3)$
  - $A(-2, -3, 2)$ ,  $B(-4, 10, 6)$ ,  $C(2, -1, 3)$
  - $A(-3, 2, 1)$ ,  $B(1, 8, -7)$ ,  $C(-5, 1, 4)$
  - $A(-1, -2, 1)$ ,  $B(2, 1, -1)$ ,  $C(2, -2, 1)$
  - $A(1, 8, -2)$ ,  $B(-2, 5, 3)$ ,  $C(-1, 4, 1)$
- Compute the area of the triangle determined by the following pairs of vectors. Calculate all inexact answers to two decimal places accuracy.
  - $(-1, 3, -2)$  and  $(4, -2, -3)$
  - $(3, -1, 2)$  and  $(2, 1, 2)$
  - $(4, -3, 5)$  and  $(3, -6, 1)$
  - $(3, 1, -2)$  and  $(-2, 5, -6)$
  - $(1, -1, -1)$  and  $(2, 2, 5)$
  - $(2, 3, -2)$  and  $(-3, 4, -1)$
- Compute the scalar and vector projections of  $\vec{a}$  on  $\vec{b}$  for each pair of vectors below.
  - $\vec{a} = (1, 2)$ ,  $\vec{b} = (-1, 3)$
  - $\vec{a} = (-3, 4)$ ,  $\vec{b} = (2, 2)$
  - $\vec{a} = (1, 2, 3)$ ,  $\vec{b} = (-2, 4, 1)$
  - $\vec{a} = (-2, 2, 3)$ ,  $\vec{b} = (-1, 2, 4)$
  - $\vec{a} = (5, 2, 1)$ ,  $\vec{b} = (1, 2, 2)$
  - $\vec{a} = (-3, 2, 4)$ ,  $\vec{b} = (-4, 3, 3)$
- Compute the direction angles  $\alpha$ ,  $\beta$ , and  $\gamma$ , formed with the positive  $x$ -,  $y$ -, and  $z$ -axes, respectively, for each of the following vectors. Report all inexact answers to two decimal places accuracy.
  - $(0, -1, 5)$
  - $(2, -1, 0)$
  - $(-3, 0, 4)$
  - $(-1, 1, 4)$
  - $(2, 3, 6)$
  - $(4, 1, -2)$
- For each of the following vector computations, say whether the result will be a scalar, a vector, or if the computation is meaningless.
  - $|\vec{a} \times \vec{b}| - |\vec{c} \times \vec{d}|$
  - $((\vec{a} \times \vec{b}) \times \vec{c}) \times \vec{d} - \vec{a} \times \vec{b}$
  - $\vec{a} \times (\vec{b} \times \vec{c}) + \vec{a} \cdot \vec{b}$
  - $\vec{a} \cdot (\vec{b} \times \vec{c}) - \vec{b} \cdot \vec{c}$
  - $((\vec{a} \times \vec{b}) \cdot \vec{c}) \times \vec{d}$
  - $((\vec{a} \times \vec{b}) \times \vec{c}) \cdot \vec{d} \cdot \vec{a} - |\vec{a} \times \vec{b}| \vec{c}$
- A tow truck driver pulls a car closer to the back of his truck with a hydraulic winch that forms an angle of  $15^\circ$  with the horizontal. If the winch on his truck pulls the car with a force of 2500 N, and the car rolled a total of 7 m horizontally to reach the back of the truck, how much work, in J, has the winch done up to this point? Report your answer to two decimal places accuracy.
- Suppose that a certain jar-opener has a handle that is 30 cm in length, and that a jar of pickles requires 10 J of torque to open. If we were to apply 40 N of force to the end of the jar opener handle at an angle of  $45^\circ$  to the handle, would the jar open? Explain, and report any inexact computations to two decimal places accuracy.