1.(1 pt)
Let **a** = (-5, -2, -5) and **b** = (8, -8, -8) be vectors. Compute the following vectors.
A. **a** + **b** = (_____ , _____ , _____)
B. 10**a**= (_____ , _____ , _____)
C. **a** - **b**= (_____ , _____ , _____)
D. $|\mathbf{a}|$ = _____

2.(1 pt)
A child walks due east on the deck of a ship at 4 miles per hour.
The ship is moving north at a speed of 5 miles per hour.
Find the speed and direction of the child relative to the surface of the water.
Speed = _____ mph
The angle of the direction from the north = _____ (radians)

3.(1 pt)
A horizontal clothesline is tied between 2 poles, 18 meters apart.
When a mass of 3 kilograms is tied to the middle of the clothesline, it sags a distance of 3 meters.
What is the magnitude of the tension on the ends of the clothesline?
Tension = _____ N

4.(1 pt)
Find $\mathbf{a} \cdot \mathbf{b}$ if
$|\mathbf{a}| = 6$,
$|\mathbf{b}| = 7$,
and the angle between **a** and **b** is $\frac{\pi}{10}$ radians.
$\mathbf{a} \cdot \mathbf{b}$ = _____

5.(1 pt)
If **a** = (10, 10, -10) and **b** = (-10, -1, 9),
find $\mathbf{a} \cdot \mathbf{b}$ = _____ .

6.(1 pt)
What is the angle in radians between the vectors
a = (1, 5, -9) and
b = (-5, 6, 3)?
Angle: _____ (radians)

7.(1 pt)
Find a unit vector in the same direction as **a** = (4, -9, -9).
(_____ ,
_____ ,
_____)

8.(1 pt)
Let **a** = (-1, 10, -2) and **b** = (-10, 7, 0) be vectors. Find the scalar, vector, and orthogonal projections of **b** onto **a**.
Scalar Projection: _____
Vector Projection:
(_____ ,
_____ ,
_____)
Orthogonal Projection:
(_____ ,
_____ ,
_____)

9.(1 pt)
A constant force $\mathbf{F} = 2\mathbf{i} - 1\mathbf{j} - 7\mathbf{k}$ moves an object along a straight line from point (8, 6, 1) to point (3, -2, 0).
Find the work done if the distance is measured in meters and the magnitude of the force is measured in newtons.
Work: _____ Nm

10.(1 pt)
A woman exerts a horizontal force of 7 pounds on a box as she pushes it up a ramp that is 5 feet long and inclined at an angle of 30 degrees above the horizontal.
Find the work done on the box.
Work: _____ ft-lb

11.(1 pt)
Gandalf the Grey started in the Forest of Mirkwood at a point with coordinates (-3, -2) and arrived in the Iron Hills at the point with coordinates (-2, 1). If he began walking in the direction of the vector $\mathbf{v} = 3\mathbf{i} + 2\mathbf{j}$ and changes direction only once, when he turns at a right angle, what are the coordinates of the point where he makes the turn.
(_____ , _____)

12.(1 pt)
If Yoda says to Luke Skywalker, "The Force be with you," then the dot product of the Force and Luke should be:

- A. positive
- B. negative
- C. any real number
- D. zero

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