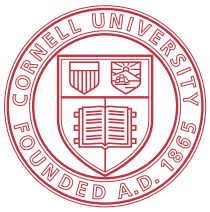

AEW Worksheet 1

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MATH 1920

Name: _____

Collaborators: _____

_____

1

Determine if the following statements are true(T) or false(F). Mark the correct answer. No justification needed.

(a) [T] [F] Suppose a vector v is defined as $v = \langle a_2 - a_1, b_2 - b_1 \rangle$, then the slope is given by $\frac{b_2 - b_1}{a_2 - a_1}$ where a and b are non-zero constants.

(b) [T] [F] For any vectors u and v in $\mathbb{R}^n$, $|u + v| = |u| + |v|$.

(c) [T] [F] For any vectors u and v in $\mathbb{R}^n$, $|u + v| \leq |u| + |v|$.

2

Find the area of the quadrilateral in the plane with vertices located at (3, 1), (7, 3), (4, 4) and (0, 3) using vector techniques.

3

Find the projection of $\langle 2s, 1, s - 1 \rangle$ onto the vector $\langle -2t, 5 - t^2, 4t \rangle$. Do you notice anything special about the projection (in terms t and s)?

4 *(Challenge)*

In this problem all coordinates are measured in meters and time is measured in seconds. At time t = 0, a ladybug, named Sam, is at position (1, 1, 1) and is flying with constant velocity $\langle 1, 2, 3 \rangle$ meters per second. A sensor placed at (3, 6, 7) can detect ladybug motion that occurs within a sphere of radius 7 meters. Does the sensor detect Sam? If so, at what time is Sam last detected by the sensor?

Hint: The position vector is

$$\vec{r}(t) = \langle 1 + t, 1 + 2t, 1 + 3t \rangle$$