Question 1:

True/False, are the following quantities vectors?

(a) $500\,\mathrm{m}$ (T / F)

(b) $500\,\mathrm{kg}$ (T / F)

(c) $600\,\mathrm{m[East]}$ (T / F)

(d) $600\,\mathrm{m[East]} - 500\,\mathrm{m[North]}$ (T / F)

(e) 603×50 (T / F)

(f) $-52^{\circ}C$ (T / F)

Question 2:

Compute the **displacement** (or net displacement) given the position vectors. Assume that the reference point is $(0, 0)$ for all vectors.

(a) $\vec{d_1} = 500\,\text{m[East]}$, $\vec{d_2} = 500\,\text{m[East]}$

(b) $\vec{d_1} = +500\,\text{km}$, $\vec{d_2} = -801\,\text{km}$, $\vec{d_3} = -120\,\text{km}$, $\vec{d_4} = +61\,\text{km}$, $\vec{d_5} = +400\,\text{km}$, $\vec{d_6} = -742\,\text{km}$.

(c) $\vec{d_i} = 601\,\text{m[Left]}$, $\vec{d_f} = 234\,\text{m[Right]}$

Question 3:

Determine the sum/difference of the following vectors **geometrically**. Use the $x-$dimensional coordinate system.

(a) $\vec{A} = +30$, $\vec{B} = -30$

$$\vec{A} + \vec{B}$$

(b) $\vec{A} = +40$, $\vec{B} = +38$, $\vec{C} = -20$, $\vec{D} = +12$

$$\vec{A} + \vec{B} - (\vec{C} + \vec{D})$$

(c) $\vec{A} = +2$, $\vec{B} = +18$, $\vec{C} = -12$, $\vec{D} = -8$, $\vec{E} = +7$

$$\vec{A} + \vec{B} + \vec{C} + \vec{D} - \vec{E}$$

Question 4:

An amazon driver had to make a round of package deliveries to the following cities; Oshawa, Pickering, Waterloo, London(Starting form AMZ headquarters). Given below are all of his position vectors along the trip (All relative to his AMZ headquarters). Compute his net **displacement** relative to AMZ headquarters as well as his total **distance** traveled (Assume that the driver strictly drives from location to location).

- $\vec{d}_{OSH} = 400\,\text{km}$[East]
- $\vec{d}_{PKR} = 350\,\text{km}$[West]
- $\vec{d}_{WTL} = 84000\,\text{m}$ [East]
- $\vec{d}_{LND} = 712\,\text{km}$[West]

Question 5:

A bird traverses 600 km[N] to London starting from Waterloo. From London, he traverses 312 km[N] to Clinton. Finally, he traverses 98 km[S] to a nearby forest relative to Clinton. Compute his net displacement relative to Waterloo as well as his total **distance** traveled.

Question 6:

Student X was travelling around UW campus the other day to get to all of classes. He was curious what his net displacement always was at the end of his tour so he decided to record his position vectors along his tour, however all of his position vectors are recorded relative to the previous building. Assuming that X starts at his residence, help him compute his net displacement relative to his residence (Abbreviated as RES).

- $\vec{d}_{\text{MC rel RES}} = 400\,\text{m[East]}$
- $\vec{d}_{\text{RCH rel MC}} = 312\,\text{m[West]}$
- $\vec{d}_{\text{QNC rel RCH}} = 600\,\text{m[East]}$
- $\vec{d}_{\text{BIO rel QNC}} = 256\,\text{m[West]}$

Note : The notation $\vec{d}_{\text{A rel B}}$ represents the position vector at location B relative to A.

Question 7:

I throw a rock in the air and after a brief period of time it returns to my hand. Prove that the rocks vertical displacement relative to my hand was zero.

Question 8:

(BONUS) I throw a rock straight up into the air from a cliff 400 m[N] from the ground. After a brief period of time it lands on the ground. What was the balls vertical displacement relative to the cliff?