MATH1130: Calculus II

SELF-ASSESSMENT SHEET 1: VECTORS IN EUCLIDEAN SPACE I

1.) In the following list of physical quantities, decide which are scalar and which are vector quantities.
Click on "Evaluate" after you have ticked the appropriate statements.

	scalar	vector
temperature	◯	◯
velocity	◯	◯
volume	◯	◯
time	◯	◯
displacement	◯	◯
force	◯	◯

Evaluate

2.) *Click on "Evaluate" after you have filled in the appropriate numbers.*

(i) Find a vector that has the same direction as $(5, -7)$ and is three times its length: (_____ , _____).

(ii) Find a vector that has the same direction as $(6, -3)$ and is one-third of its length: (_____ , _____).

(iii) Find a vector that has the opposite direction as $(1, -3, 2)$ and is five times its length: (_____ , _____ , _____).

Evaluate

3.) *Click on "Evaluate" after you have filled in the appropriate numbers.*

Let $\boldsymbol{x} = (3, 4, -12)$. So its norm is $\|\boldsymbol{x}\| = \sqrt{\_\_\_\_\_} = \_\_\_\_\_$.
Thus the vector $\boldsymbol{y} = \boldsymbol{x}/\|\boldsymbol{x}\|$ is given by

$$\boldsymbol{y} = \left(\frac{\_\_\_\_\_}{\_\_\_\_\_}, \frac{\_\_\_\_\_}{\_\_\_\_\_}, \frac{\_\_\_\_\_}{\_\_\_\_\_}, \right),$$

and its norm is $\|\boldsymbol{y}\| = \_\_\_\_\_$.

Evaluate

Please turn over!

4.) Two vectors are *parallel* provided that one is scalar multiple of the other. Determine whether the vectors $\boldsymbol{x}$ and $\boldsymbol{y}$ in the following cases are parallel.
Click on "Evaluate" after you have ticked those that are parallel.

◯ $\boldsymbol{x} = (4, -2, 6)$ and $\boldsymbol{y} = (6, -3, 9)$.

◯ $\boldsymbol{x} = (4, -2, 6)$ and $\boldsymbol{y} = (4, 2, 2)$.

◯ $\boldsymbol{x} = (12, -20, 16)$ and $\boldsymbol{y} = (-9, 15, -12)$.

◯ $\boldsymbol{x} = (12, -20, 17)$ and $\boldsymbol{y} = (-9, 15, 24)$.

Evaluate