

MATH1130: Calculus II

SELF-ASSESSMENT SHEET 2: VECTORS IN EUCLIDEAN SPACE II

- 1.) We know how spheres and balls look like in 2-space and 3-space, but what about \mathbb{R} itself? E.g., what are $S_3^0(5)$, $B_3^1(5)$ and $\overline{B}_3^1(5)$, i.e., the sphere, open ball and closed ball of radius 3 with center 5? And what about the general case $S_r^0(x)$, $B_r^1(x)$ and $\overline{B}_r^1(x)$?

For the solution, click on the following space:

- 2.) Answer the following questions.

Click on "Evaluate" after you have ticked those where the point is contained in the corresponding ball.

Is the point $(1, 4, 5)$ in the open ball $B_4^3((-1, 2, 3))$? *Hint*

Is the point $(3, 2, -1, 4, 1)$ in the open ball $B_3^5((1, 2, -4, 2, 3))$. *Hint*

Evaluate

- 3.) Which of the following pairs of vectors are perpendicular.

Click on "Evaluate" after you have ticked those that are perpendicular.

$(1, -1, 1)$ and $(2, 1, 5)$. *Hint*

$(1, -1, 1)$ and $(2, 3, 1)$. *Hint*

$(-5, 2, 7)$ and $(3, -1, 2)$. *Hint*

$(\pi, 2, 1)$ and $(2, -\pi, 0)$. *Hint*

Evaluate

Please turn over!

- 4.) Is the zero vector $\mathbf{0}$ in \mathbb{R}^n perpendicular to any vector?
For the solution, click on the following space:

- 5.) Find $\mathbf{x} \times \mathbf{y}$!

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

(i) $\mathbf{x} = (5, -1, -2)$, $\mathbf{y} = (-3, 2, 4)$;

$\mathbf{x} \times \mathbf{y} = (\quad , \quad , \quad)$.

(ii) $\mathbf{x} = (1, -1, 3)$, $\mathbf{y} = (-2, 3, 1)$;

$\mathbf{x} \times \mathbf{y} = (\quad , \quad , \quad)$.

Evaluate