

SECOND HOMEWORK

Feel free to work with others, but the final write-up should be entirely your own and based on your own understanding.

1. (10 pts) (1.3.27).
2. (5 pts) Let $\vec{u} = (1, -1, 2)$, $\vec{v} = (2, 1, 1)$, and $\vec{w} = (0, 2, -1)$. Is the triple $\vec{u}, \vec{v}, \vec{w}$ a right-hand set or a left-handed set? Why?
3. (15 pts) (a) Let

$$A = A(\theta) = \begin{pmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{pmatrix},$$

and let $f: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be the function which sends the vector $\vec{v} = (x, y)$ to the vector $\vec{w} = f(\vec{v}) = A\vec{v}$. Show that $\vec{w} = f(\vec{v})$ is the vector \vec{v} rotated around the origin through an angle of θ , so that the function f represents rotation around the origin through an angle of θ .

(b) Show, by direct computation, that if $B = A(\theta)$ and $C = A(\phi)$, then $BC = A(\theta + \phi)$.

(c) Explain why (b) holds.

4. (5 pts) (1.4.6).
5. (5 pts) (1.4.11).
6. (5 pts) (1.4.18).
7. (8 pts) (1.4.26).
8. (5pts) (1.5.7)
9. (5 pts) (1.5.8).
10. (5 pts) (1.5.9).
11. (5 pts) (1.5.12).
12. (5 pts) (1.5.20).
13. (5 pts) (1.5.24).
14. (5 pts) (1.5.28).
15. (5 pts) (1.6.9).
16. (5 pts) (1.6.11).
17. (5 pts) (1.6.14).
18. (5 pts) (1.6.21).

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18.022 Calculus of Several Variables
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