Checklist

Daniel Chan

UNSW

Semester 1 2017

Chapter 1

Chapter 1

You learnt:

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- vector addition and scalar multiplication are useful in understanding geometry and physics

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- parametric forms for lines and planes

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- Prove geometric results using vectors
- convert between parametric and Cartesian forms
- check vectors, lines, planes are parallel

Chapter 1 question

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$$L : \frac{x-1}{3} = \frac{y+7}{2} = \frac{2z-3}{4}, \qquad L' : \mathbf{x} = \begin{pmatrix} 4 \\ 3 \\ 5 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ 2 \\ 2 \end{pmatrix}.$$

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You can now use these tools to calculate:

- lengths,
- angles,
- projections,
- shortest distances,
- areas &
- volumes

Chapter 2 question

Q Explain why the following lines are parallel and find the distance between them.

$$L : x + 3y = 1, \quad L' : 2x + 6y = 3.$$

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- convert between trigonometric polynomials & polnomials of trig functions
- factorise polynomials over reals & complexes
- compute complex loci

Chapter 3 question

Q Express $\sin^3(\theta)$ as a linear combination of $1, \sin(\theta), \sin(2\theta), \sin(3\theta), \cos(\theta), \cos(2\theta), \cos(3\theta)$.

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- Solve any system of linear equations
- apply this to find intersections in geometry,
- Use theory to answer more sophisticated questions involving linear algebra.

Q Fix $\alpha \in \mathbb{R}$. Compute the span of the vectors

$$\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 5 \\ \alpha - 3 \\ 0 \end{pmatrix}, \begin{pmatrix} -13 \\ 1 \\ 2 \end{pmatrix}.$$

Express your answer in cartesian form.

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- familiar with the algebra of matrices
- can check invertibility & find inverses of matrices
- can compute determinants using Gaussian elimination & understand rules for manipulating them.