

Math 422-5922

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Homework N1

Due January 31

1.  $\vec{A}_1, \vec{A}_2, \vec{A}_3, \vec{A}_4, \vec{A}_5$  - five vectors

Find their vector product?

$$\vec{A}_1 \times \vec{A}_2 \times \vec{A}_3 \times \vec{A}_4 \times \vec{A}_5 = ?$$

Hint: calculate first  $\vec{A}_3 \times \vec{A}_4 \times \vec{A}_5$ 

2. Find the curvature and the torsion of the stretching Helix

$$x = R \cos t$$

$$y = R \sin t$$

$$z = \frac{Rt^2}{2}$$

3. Calculate

$$\sqrt{2(1-i)}$$

4. Calculate  $i^{(-i)}$  (Use the polar form of complex numbers)

5. Find a limit of sequence:

$$S_n = \left(1 - \frac{1}{n^2}\right)^n \quad \lim_{n \rightarrow \infty} S_n = ?$$

6. It is known that

$$\sum_{n=1}^{\infty} \frac{1}{n} = \ln N + c + o\left(\frac{1}{N}\right)$$

Evaluate the series

$$\sum \frac{1}{n(n+1)}$$

Hint: Use partial fractions

7. Evaluate the series

$$\sum_{n=1}^{\infty} f_n(x)$$

$$f_n = \frac{x^3}{(1+x^2)^n}$$

Does this series converge uniformly?

Let the partial sum be

$$S_N = \sum_{n=1}^N f_n(x)$$

Plot  $S_1^{(x)}$ ,  $S_2^{(x)}$ ,  $S_3^{(x)}$ ,  $S_4^{(x)}$