

- (20 pts) 1. If $\vec{A} = i + 2j - 2k$ and $\vec{B} = 2i + j - k$ find
- $\vec{A} \circ \vec{B}$
 - $\vec{A} \times \vec{B}$
 - The area of the triangle generated by \vec{A} and \vec{B} .
 - The length of the projection of \vec{B} onto \vec{A} .
 - Vectors \vec{B}_1 and \vec{B}_2 such that $\vec{B} = \vec{B}_1 + \vec{B}_2$, \vec{B}_1 is parallel to \vec{A} and \vec{B}_2 is perpendicular to \vec{A} .
- (20 pts) 2. Which of the following sequences converge? Why? What is the limit?
- $a_n = \frac{n^2 - 2n + 1}{n - 1}$
 - $a_n = (2 - \frac{1}{n})(3 + \frac{2}{n})$
 - $a_n = n^{\frac{2}{n}}$
 - $a_n = \frac{(\log n)^2}{n}$
- (20 pts) 3. Which of the following series converge? Why?
- $\sum_{n=1}^{\infty} \frac{3}{\sqrt{n}}$
 - $\sum_{n=1}^{\infty} \frac{1 + \cos n}{n^2}$
 - $\sum_{n=1}^{\infty} \sin(\frac{1}{n})$
 - $\sum_{n=1}^{\infty} \frac{n!}{(2n+1)!}$
 - $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n = 1\sqrt{n}}$
 - $\sum_{n=1}^{\infty} (-1)^{n+1}(\frac{n+3}{n+5})$
- (20 pts) 4. a) For what value of x does the series $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}(x+2)^n}{n2^n}$ converge? Where does it converge absolutely.
- b) Find Taylor Series in powers of $(x - \frac{\pi}{2})$ for $f(x) = \cos x$, $f(x) = \sin x$, and $f(x) = x$.
- (15 pts) 5. a) Carefully state the Limit Comparison Test for the two series $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$.
- b) Prove that the McLaurin Series for e^x converges for all x .
- c) If $f(x) = \sum_{n=0}^{\infty} c_k x^k$ for $|x| < \rho$ prove $c_2 = \frac{f''(0)}{2!}$.