MAT 162 Review – Chapter 11

1. Sequences Exam A
   a. Convergence and divergence
   b. Special limits
   c. $\lim_{x\to\infty}\sqrt[n]{n}=1,\ \lim_{x\to\infty}\frac{\ln n}{n}=0,\ \lim_{x\to\infty}\sqrt[n]{x}=1,\ \lim_{x\to\infty}\left(1+\frac{x}{n}\right)^n=e^x,\ \lim_{x\to\infty}x^n=0,|x|<1,$
   d. Recursive definitions
2. Infinite Series Exam A
   a. *n*th Partial Sum
   b. Convergence vs Divergence
   c. Geometric Series: $\sum_{n=0}^{\infty}ar^n=a+ar+ar^2+\ldots$ Converges: $S=\frac{a}{1-r},|r|<1$; Diverges: $|r|\geq 1$
   d. Harmonic series, alternating harmonic series, *p*-series
   e. *n*th term divergence test
   f. Convergence Tests – Comparison, Limit Comparison, Integral Test, Ratio Test, Root Test
   g. Alternating Series and Alternating Series (Leibniz) Test
   h. Conditional vs Absolute Convergence
   i. Remainder estimates
3. Power Series $\sum_{n=0}^{\infty}c_n(x-a)^n$ Exam B
   a. Radius and Interval of Convergence (Ratio & Root tests)
   b. Functions as Power Series – use of geometric series to develop new series, differentiation and integration of power series. (Know geometric series)
4. Taylor-Maclaurin Series Exam B
   a. $f(x)=f(a)+f'(a)(x-a)+\frac{f''(a)}{2!}(x-a)^2+\frac{f'''(a)}{3!}(x-a)^3+\cdots\frac{f^{(n)}(a)}{n!}(x-a)^n+\cdots$
   b. Interval of Convergence $|x-a|<R$
   c. Special Maclaurin Series
      i. $e^x=1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\cdots+\frac{x^n}{n!}+\cdots$ for $(-\infty,\infty)$
      ii. $\cos x=1-\frac{x^2}{2}+\frac{x^4}{4!}+\cdots$
      iii. $\sin x=x-\frac{x^3}{3!}+\frac{x^5}{5!}+\cdots$
      iv. $\frac{1}{1-x}=1+x+x^2+x^3+\cdots+x^n+\cdots$
      v. $\ln(1+x)=x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+\cdots+\frac{(-1)^n x^{n+1}}{n+1}+\cdots$
      vi. $\tan^{-1}x=x-\frac{x^3}{3}+\frac{x^5}{5}-\frac{x^7}{7}+\cdots$
   d. Binomial Series: $(1+x)^k=1+kx+\frac{k(k-1)}{2!}x^2+\frac{k(k-1)(k-2)}{3!}x^3+\cdots$
      $=\sum_{n=0}^{\infty}\binom{k}{n}x^n$