

MAT 152 Review – Chapter 12

1. Geometric Sequences

a. Know the notation

b. Geometric Sequence: $a_n = ar^{n-1}$

c. Sum of n terms of a Geometric Sequence: $S_n = \frac{a(r^n - 1)}{r - 1}$

2. Annuities

a. Annuity Amount: $S = R \left[\frac{(1+i)^n - 1}{i} \right]$

b. Present Value of an Annuity: $P = R \left[\frac{1 - (1+i)^{-n}}{i} \right]$

3. Taylor Polynomials

a. $P_n(x) = \sum_{i=0}^n \frac{f^{(i)}(0)}{i!} x^i = f(0) + f'(0)x + \frac{f''(0)}{2!} x^2 + \frac{f'''(0)}{3!} x^3 + \dots + \frac{f^{(n)}(0)}{n!} x^n$

4. Infinite Series

a. nth Partial Sum

b. Convergence vs Divergence

c. Infinite Geometric Series

i. Converges: $S = \frac{a}{1-r}, |r| < 1$

ii. Diverges: $|r| \geq 1$

5. Taylor Series

a. $f(x) = f(0) + f'(0)x + \frac{f''(0)}{2!} x^2 + \frac{f'''(0)}{3!} x^3 + \dots$

b. Interval of Convergence

c. Special Series

i. $e^x = 1 + x + \frac{1}{2!} x^2 + \frac{1}{3!} x^3 + \dots + \frac{1}{n!} x^n + \dots$ for $(-\infty, \infty)$

ii. $\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots + \frac{(-1)^n x^{n+1}}{n+1} + \dots$

iii. $\frac{1}{1-x} = 1 + x + x^2 + x^3 + \dots + x^n + \dots$

d. Composition with Taylor Series

e. Integrating Taylor Series

f. Rules of 70 and 72 for Doubling Time