

PRECALCULUS PROBLEM SESSION #15- PRACTICE PROBLEMS

Sequences & Series

A) Write the first five terms of each sequence.

1. $a_n = \left(-\frac{1}{2}\right)^n$

2. $a_n = \frac{n!}{n}$

3. $a_n = (-1)^n \left(\frac{n}{n+1}\right)$

B) Find the indicated term of the sequence.

1. $a_n = (-1)^n(3n - 2)$; find a_{25}

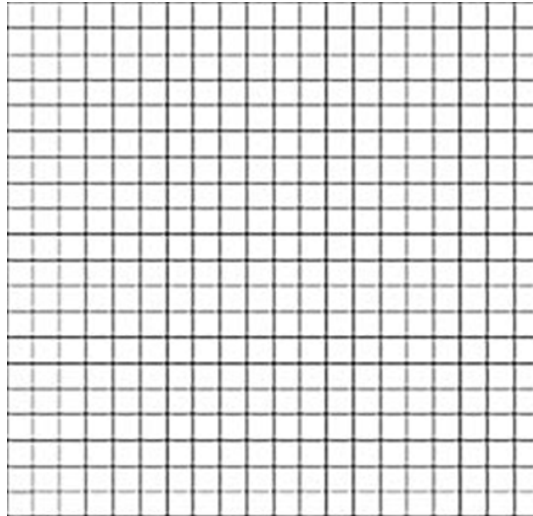
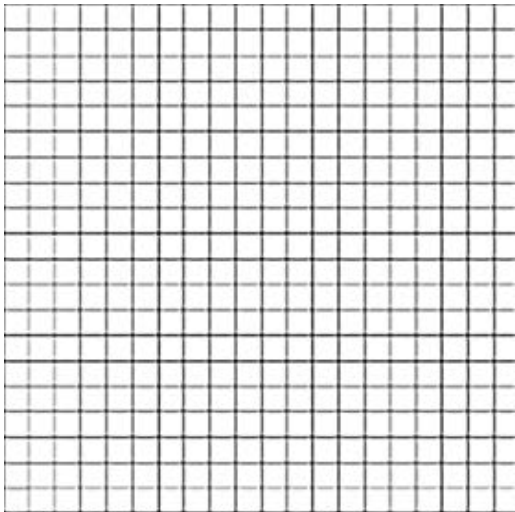
2. $a_n = \frac{2^n}{n!}$; find a_{10}

3. $a_n = \frac{4n}{2n^2-3}$; find a_{11}

C) Graph the first 10 terms of the given sequences (Let n be the x - value and a_n be the y - values).

1. $a_n = \frac{3}{4}n$

2. $a_n = \frac{2n}{n+1}$



D) Write an expression for the *most apparent nth* term of the sequence. (Assume that n begins with 1).

1. 1, 4, 7, 10, 13, ...

2. $-\frac{2}{3}, \frac{3}{4}, -\frac{4}{5}, \frac{5}{6}, -\frac{6}{7}, \dots$

3. $1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}, \frac{1}{25}, \dots$

E) Simplify the ratio of factorials.

1. $\frac{4!}{6!}$

2. $\frac{10!}{8!}$

3. $\frac{(n+1)!}{n!}$

F) Find the sum.

1. $\sum_{i=1}^5 (2i + 1)$

2. $\sum_{j=3}^5 \frac{1}{j^2-3}$

3. $\sum_{k=2}^5 (k + 1)^2 (k - 3)$

4. $\sum_{i=1}^4 2^i$

G) Use sigma notation to write the sum.

$$1. \frac{1}{3(1)} + \frac{1}{3(2)} + \frac{1}{3(3)} + \cdots + \frac{1}{3(9)}$$

$$2. \left[2 \left(\frac{1}{8} \right) + 3 \right] + \left[2 \left(\frac{2}{8} \right) + 3 \right] + \cdots + \left[2 \left(\frac{8}{8} \right) + 3 \right]$$

$$3. 3 - 9 + 27 - 81 + 243 - 729$$

$$4. \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots - \frac{1}{20^2}$$

$$5. \frac{1}{4} + \frac{3}{8} + \frac{7}{16} + \frac{15}{32} + \frac{31}{64}$$

Arithmetic Sequences

A) Find a formula for a_n for the arithmetic sequence.

$$1. a_1 = 5, d = 6$$

$$2. a_1 = 100, d = -8$$

$$3. a_1 = x, d = 2x$$

$$4. 4, \frac{3}{2}, -1, -\frac{7}{2}, \dots$$

$$5. a_3 = 94, a_6 = 85$$

B) Find the indicated n th partial sum of the arithmetic sequence.

$$1. 8, 20, 32, 44, \dots, n = 10$$

$$2. 40, 37, 34, 31, \dots, n = 10$$

$$3. a_1 = 100, a_{25} = 220, n = 25$$

C) Find the partial sum.

$$1. \sum_{n=1}^{50} n$$

$$2. \sum_{n=10}^{100} 6n$$

$$3. \sum_{n=11}^{30} n - \sum_{n=1}^{10} n$$

$$4. \sum_{n=1}^{400} (2n - 1)$$

Geometric Sequences

A) Find the n th term of the geometric sequence.

$$1. a_1 = 4, r = \frac{1}{2}, n = 10$$

$$2. a_1 = 6, r = -\frac{1}{3}, n = 12$$

$$3. a_1 = 100, r = e^x, n = 9$$

$$4. a_1 = 500, r = 1.02, n = 40$$

$$5. a_1 = 16, a_4 = \frac{27}{4}, n = 3$$

$$6. a_4 = -18, a_7 = \frac{2}{3}, n = 6$$

B) Find the sum of the finite geometric series.

$$1. \sum_{n=1}^9 2^{n-1}$$

$$2. \sum_{i=1}^7 64 \left(-\frac{1}{2} \right)^{i-1}$$

$$3. \sum_{n=0}^{20} 3 \left(\frac{3}{2} \right)^n$$

$$4. \sum_{n=0}^5 300(1.06)^n$$

$$5. \sum_{i=1}^{10} 8 \left(-\frac{1}{4} \right)^{i-1}$$

C) Use summation notation to express the sum.

$$1. 5 + 15 + 45 + \cdots + 3645$$

$$2. 2 - \frac{1}{2} + \frac{1}{8} - \cdots + \frac{1}{2048}$$

$$3. 0.1 + 0.4 + 1.6 + \cdots + 102.4$$