Section 10.1

2.) $a_n = \left(\frac{-1}{2}\right)^n$: $\frac{-1}{2}, \frac{1}{4}, \frac{-1}{8}, \frac{1}{16}, \frac{-1}{32}, \ldots$

3.) $a_n = \frac{n}{n+1}$: $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \ldots$

4.) $a_n = \frac{n-1}{n^2+2}$: $0, \frac{1}{6}, \frac{2}{11}, \frac{1}{6}, \frac{4}{27}, \ldots$

5.) $a_n = \frac{3^n}{n!}$: $3, \frac{9}{2}, \frac{9}{2}, \frac{27}{8}, \frac{81}{40}, \ldots$

7.) $a_n = \frac{(-1)^n}{n^2}$: $-1, \frac{1}{4}, \frac{-1}{9}, \frac{1}{16}, \frac{-1}{25}, \ldots$

31.) $1, 4, 7, 10, \ldots \quad 1+3(n-1) = \boxed{3n-2}$

position: $1 \quad 2 \quad 3 \quad 4 \quad \ldots \quad n$

34.) $1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}, \ldots \quad \boxed{\frac{1}{n^2}}$

position: $1 \quad 2 \quad 3 \quad 4 \quad \ldots \quad n$

36.) $2, \frac{3}{3}, \frac{4}{5}, \frac{5}{7}, \frac{6}{9}, \ldots \quad \boxed{\frac{n+1}{2n-1}}$

position: $1 \quad 2 \quad 3 \quad 4 \quad 5 \quad \ldots \quad n$

38.) $\frac{1}{3}, \frac{2}{3^2}, \frac{2^2}{3^3}, \frac{2^3}{3^4}, \ldots \quad \boxed{\frac{2^{n-1}}{3^n}}$

position: $1 \quad 2 \quad 3 \quad 4 \quad \ldots \quad n$

40.) $1+\frac{1}{2}, 1+\frac{1}{2^2}, 1+\frac{1}{2^3}, 1+\frac{1}{2^4}, \ldots \quad \boxed{1+\frac{1}{2^n}}$

position: $1 \quad 2 \quad 3 \quad 4 \quad \ldots \quad n$

41.) $-2, 2, -2, 2, -2, \ldots \quad \boxed{(-1)^n \cdot 2}$

position: $1 \quad 2 \quad 3 \quad 4 \quad 5 \quad \ldots \quad n$

42.) $2, -4, 6, -8, 10, \ldots$ $\boxed{(-1)^{n+1} \cdot 2n}$

position: 1 2 3 4 5 … n

44.) $1, \frac{x}{1}, \frac{x^2}{2\cdot 1}, \frac{x^3}{3\cdot 2\cdot 1}, \frac{x^4}{4\cdot 3\cdot 2\cdot 1}, \frac{x^5}{5\cdot 4\cdot 3\cdot 2\cdot 1}, \ldots$ $\boxed{\frac{x^{n-1}}{(n-1)!}}$

position: 1 2 3 4 5 6 … n

50.) $5, 5\cdot 2, 5\cdot 2^2, 5\cdot 2^3, 5\cdot 2^4, \ldots$ $\boxed{5\cdot 2^{n-1}}$

position: 1 2 3 4 5 … n

51.) $2, 2\cdot 3, 2\cdot 3^2, 2\cdot 3^3, \ldots$ $\boxed{2\cdot 3^{n-1}}$

position: 1 2 3 4 … n

66.) $1+2+3+4+\cdots+n = \frac{1}{2}n(n+1)$

a.) $1, 3, 6, 10, 15, \ldots$

b.) $1+2+3+\cdots+50 = \frac{1}{2}(50)(50+1) = 1275$

68.) a.)

bounce: 1 2 3 4 5 … $n-1$ n

rebound: $\left(\frac{2}{3}\right)12, \left(\frac{2}{3}\right)^2 12, \left(\frac{2}{3}\right)^3 12, \left(\frac{2}{3}\right)^4 12, \ldots$ $\boxed{\left(\frac{2}{3}\right)^n 12}$

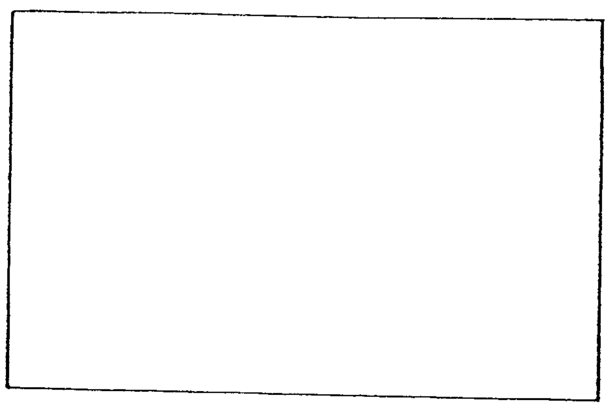
position: 1 2 3 4 … n

Math 16C
Kouba
Worksheet 9

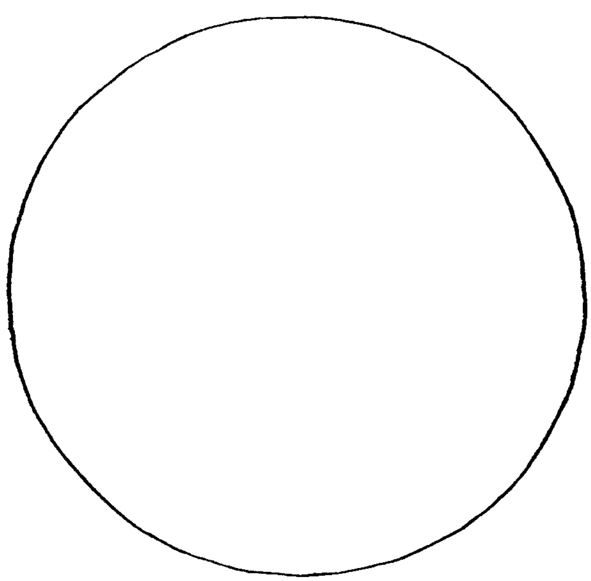
1.) Find the nth term of the following sequence : 5, 6, 8, 11, 15, 20, . . .

2.) An edible protein supplement guarantees to increase your weight by 1% per week. If you weigh 140 pounds now, what is your projected weight after eating this supplement for 60 weeks ?

3.) What is the maximum number of rectangles into which the given rectangle can be divided using 200 vertical lines ? Count all distinct rectangles, including overlapping rectangles.



4.) What is the maximum number of parts into which the following circle can be divided using 300 straight lines ? Count only distinct non-overlapping parts.



Worksheet 9

(1.)

position	number
1	$5 = 5$
2	$6 = 5+(1)$
3	$8 = 5+(1+2)$
4	$11 = 5+(1+2+3)$
5	$15 = 5+(1+2+3+4)$
6	$20 = 5+(1+2+3+4+5)$
$\vdots$	$\vdots$
n	$5+(1+2+3+\cdots+(n-1))$

$$= 5 + \frac{(n-1)((n-1)+1)}{2}$$

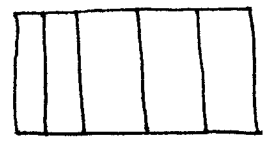
$$= \boxed{5 + \frac{(n-1)n}{2}}$$

(2.)

# weeks	weight
1	$140 + (.01)140 = (1+.01)140 = (1.01)140$
2	$(1.01)140 + (.01)(1.01)140 = (1+.01)(1.01)140 = (1.01)^2 140$
3	$(1.01)^2 140 + (.01)(1.01)^2 140 = (1.01)^3 140$
4	$(1.01)^4 140$
$\vdots$	$\vdots$
n	$(1.01)^n 140$

If $n = 60$ weeks then weight is

$$(1.01)^{60} 140 = \boxed{254.3 \text{ lbs.}}$$

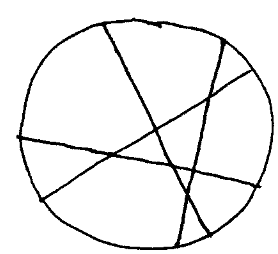


(3.) <u>#lines</u> <u>#rectangles</u>

1	3	= 1+2
2	6	= 1+2+3
3	10	= 1+2+3+4
4	15	= 1+2+3+4+5
5	21	= 1+2+3+4+5+6
⋮	⋮	
n	$1+2+3+4+\cdots+(n+1)$	$= \frac{(n+1)((n+1)+1)}{2} = \frac{(n+1)(n+2)}{2}$

If $n = 200$ lines then $\frac{(200+1)(200+2)}{2} = \boxed{20{,}301 \text{ rec's}}$

(4.) <u>#lines</u> <u>#pieces</u>



1	$2 = 1 + (1)$
2	$4 = 1 + (1+2)$
3	$7 = 1 + (1+2+3)$
4	$11 = 1 + (1+2+3+4)$
5	$16 = 1 + (1+2+3+4+5)$
⋮	⋮
n	$1 + (1+2+3+4+\cdots+n) = 1 + \frac{n(n+1)}{2}$

If $n = 300$ lines then

$$1 + \frac{300(300+1)}{2} = \boxed{45{,}151 \text{ parts}}$$