Pre-Calculus **HW#10-R** **Name:** Key

1. Write the first 5 terms: $a_n = \frac{72}{n!}$. 72, 36, 12, 3, $\frac{3}{5}$

2. Write in summation notation: $\frac{1}{2}+\frac{1}{4}+\frac{1}{6}+\ldots+\frac{1}{40}$ $\sum_{i=1}^{20} \frac{1}{2i}$

Write the first 5 terms of each arithmetic sequence.

3. $a_1 = 3, d = 4$

3, 7, 11, 15, 19

4. $a_4 = 10, a_{10} = 28$

1, 4, 7, 10, 13

$10 + 6d = 28$
$6d = 18$
$d = 3$
$a_3 = 7$
$a_2 = 4$
$a_1 = 1$

5. Write the rule, a_n, for the arithmetic sequence, then find the sum of the first 20 terms: $a_1 = 10, a_3 = 28$.

$10 + 2d = 28$
$2d = 18$
$d = 9$

$a_n = 10 + 9(n-1)$

$\boxed{a_n = 9n + 1}$

$S_n = (10 + 181)10$

$= \boxed{1910}$

Find each sum.

6. $\sum_{i=1}^{10}(2i-3)$

$a_1 = -1$
$a_{10} = 17$
$S_n = (-1+17)5 = \boxed{80}$

7. $\sum_{i=1}^{11}(\frac{2}{3}i+4)$

$a_1 = 4\frac{2}{3}$
$a_{11} = 11\frac{1}{3}$
$S_n = (4\frac{2}{3} + 11\frac{1}{3})\frac{11}{2} = \boxed{88}$

Write the first 5 terms of each geometric sequence.

8. $a_1 = 4, r = -\frac{1}{4}$

4, -1, $\frac{1}{4}$, $-\frac{1}{16}$, $\frac{1}{64}$

9. $a_1 = 9, a_3 = 4$

9, 6, 4, $\frac{8}{3}$, $\frac{16}{9}$

$9 \cdot r^2 = 4$
$r^2 = \frac{4}{9}$
$r = \frac{2}{3}$

10. Write the rule, a_n, for the geometric sequence, then find the sum of the first 20 terms: $a_1 = 16, a_2 = -8$. $r = -\frac{1}{2}$

$\boxed{a_n = 16\left(-\frac{1}{2}\right)^{n-1}}$

$S_n = 16\left(\frac{1-(-\frac{1}{2})^{20}}{1-(-\frac{1}{2})}\right) = \boxed{10.67}$

Find each sum.

11. $\sum_{i=1}^{7} 2^{i-1}$

$S_n = 1\left(\frac{1-2^7}{1-2}\right)$

$= \boxed{127}$

12. $\sum_{i=1}^{\infty} \left(\frac{7}{8}\right)^{i-1}$

$S_n = \frac{1}{1-\frac{7}{8}}$

$= \boxed{8}$

13. $\sum_{k=1}^{\infty} 4\left(\frac{1}{3}\right)^{k-1}$

$S_n = \frac{4}{1-\frac{1}{3}}$

$= \frac{4}{\frac{2}{3}} = \boxed{6}$

Expand each binomial.

14. $\left(\frac{x}{2}+y\right)^4$

$1\cdot\left(\frac{x}{2}\right)^4 + 4\left(\frac{x}{2}\right)^3 y + 6\left(\frac{x}{2}\right)^2 y^2 + 4\left(\frac{x}{2}\right) y^3 + y^4$

$\frac{x^3}{8}$ $\qquad$ $\frac{x^4}{4}$

$$\boxed{\frac{x^4}{16} + \frac{x^3}{2}y + \frac{3x^2}{2}y^2 + 2xy^3 + y^4}$$

15. $(5+2i)^4$

$5^4 + 4\cdot 5^3\cdot(2i) + 6\cdot 5^2(2i)^2 + 4\cdot 5(2i)^3 + (2i)^4$

$625 + 1000i - 600 - 160i + 16$

$$\boxed{41 + 840i}$$