Quiz 1 Version M
Fri Jan 13, 2012

SCORE: 14 / 20 POINTS

$a_n = a_1 + (n-1)d$

$S_n = \frac{n}{2}(a_1 + a_n)$

WHERE INDICATED, YOU MUST SHOW THE WORK THAT LEAD TO YOUR ANSWER TO GET FULL CREDIT.

Find the first 4 terms of the sequence defined recursively by $a_1 = 1, \quad a_k = k^2 - a_{k-1}$ (for $k \geq 2$). SCORE: 3 / 3 POINTS

$a_1 = 1$

$a_2 = (2)^2 - a_{2-1} = 4 - 1 = 3$ ✓

$a_3 = (3)^2 - a_{3-1} = 9 - 3 = 6$ ✓

$a_4 = (4)^2 - a_{4-1} = 16 - 6 = 10$ ✓

$1, 3, 6, 10$

Simplify the expression $\frac{(3n-3)!}{(3n-1)!}$. SCORE: 0 / 3 POINTS

SHOW YOUR WORK.

$\frac{(3n-3)!}{(3n-1)!}$ $\quad 3-3$ $\quad 6-3 = 3!$ $\quad 12-3 = 9!$

$6-1 = 5!$ $\quad 12-1 = 11!$

$\frac{1}{(3n+2)!}$

Find a general formula for the arithmetic sequence whose first term is 6, and whose fourth term is 11. SCORE: 3 / 3 POINTS

SHOW YOUR WORK.

$11 = 6 + (4-1)d$

$11 = 6 + 4d - d$ ✓

$11 = 6 + 3d$

$-6 \quad -6$

$\frac{5}{3} = \frac{3d}{3}$

$\frac{5}{3} = d$ $\frac{1}{2}$

$a_n = 6 + (n-1)\frac{5}{3}$ $1\frac{1}{2}$

$a_4 = 6 + (4-1)\frac{5}{3}$

$a_4 = 6 + (3)(\frac{5}{3})$

$a_4 = 6 + 5 = 11$ ✓

SHOW YOUR WORK. SIMPLIFY YOUR ANSWER.

$\sum_{m=2}^{5} m(m-3)$

$a_2: 2(2-3) = -2$ ½ $\quad -2+0+4+10 = \boxed{12}$ 1

$a_3: 3(3-3) = 0$ ½

$a_4: 4(4-3) = 4$ ½

$a_5: 5(5-3) = 10$ ½

Find the first 5 terms of the sequence defined by $a_n = \dfrac{1-(-1)^n}{n!}$.

SCORE: 3 / 3 POINTS

SIMPLIFY YOUR ANSWERS.

$a_1 = \dfrac{1-(-1)^1}{1!} = \dfrac{1-(-1)}{1} = \dfrac{2}{1} = 2$ ½

$a_2 = \dfrac{1-(-1)^2}{2!} = \dfrac{1-(1)}{2\cdot 1} = \dfrac{0}{2} = 0$ ½

$a_3 = \dfrac{1-(-1)^3}{3!} = \dfrac{1-(-1)}{3\cdot 2\cdot 1} = \dfrac{2}{6} = \dfrac{1}{3}$ ½

$a_4 = \dfrac{1-(-1)^4}{4!} = \dfrac{1-(1)^{11}}{4\cdot 3\cdot 2\cdot 1} = \dfrac{0}{24} = 0$ ½

$a_5 = \dfrac{1-(-1)^5}{5!} = \dfrac{1-(-1)}{5\cdot 4\cdot 3\cdot 2\cdot 1} \quad \dfrac{2}{120} = \dfrac{1}{60}$ ½

$\boxed{2, 0, \frac{1}{3}, 0, \frac{1}{60}}$ $+\frac{1}{2}$ ALL 5 CORRECT

Fill in the blanks: For the sum $\sum_{m=2}^{k} a_m$,

m is called the lower level of summation, **SCORE: ½ / 2 POINTS**

k is called the upper level of summation, and

2 is called the starting n^{th} term.

Use sigma notation to write the sum $\dfrac{1}{4}+\dfrac{3}{8}+\dfrac{7}{16}+\dfrac{15}{32}+\dfrac{31}{64}$.

SCORE: 1½ / 3 POINTS

1 2 3 4 5

½ $\left[\sum_{n=1}^{5} 2n+1\right]$ ½

1×4

2×4