Student on a factorial finding mission _____ per D

Analysis Quiz 2 2013/14. NO Calculators please.

1. Find r and s such that $\frac{r!}{s!} = \frac{1}{20 \cdot 19 \cdot 18 \cdot 17}$ [2 pts]

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r = 16 ✓ s = 20 ✓

2. Write without factorials. Simplify: $\frac{(n-2)!}{(n+1)!} = \frac{1}{(n-1)n(n+1)}$ ✓ [3]

3. What is the common difference of a 20 term arithmetic sequence that adds to 300, knowing that the first term is 2? [3]

2 ___

$\frac{300}{10} = 30$ $30-2=28$

$2+19d=28$

$19d=26$ ✓

$d=\frac{26}{19}$

4. The 2nd term of a geometric series is 5. The 11th term is 100. Find the common ratio. [3]

5 _____ 100

$5r^9=100$ $r=\sqrt[9]{20}$ ✓

$r^9=20$

3. $4 + 11/2 + 7 + 17/2 + 10 + \ldots 1000 =$ 333830 [3]

$4+\frac{3}{2}d=1000$ $3d=1992$

$\frac{3}{2}d=996$ $d=664$

$\frac{1004 \cdot 665}{2}$ ✓ $=333830$

502 × 665 = 1330 + 0000 + 3325 = 333830

4. Find the geometric mean of 3, 2, 5 and 5 exactly. Explain what this number represents. [3]

$\sqrt[4]{3 \cdot 2 \cdot 5 \cdot 5} = \sqrt[4]{150}$ ✓

$\sqrt[4]{150}$ is the geometric mean of 2, 3, 5, and 5. This number ~~represents~~ raised to the power of 4 (4 numbers: 2,3,5,5) would be the same as the product of 2, 3, 5, 5. ✓

7. $6-\frac{6}{2^2}+\frac{6}{2^4}-\frac{6}{2^6}+\ldots.+\frac{6}{2^{188}}=$ [3]

$X=6-\frac{6}{2^2}+\frac{6}{2^4}-\frac{6}{2^6}+\ldots+\frac{6}{2^{188}}$

$4X=24-6+\frac{6}{2^2}-\frac{6}{2^4}+\ldots-\frac{6}{2^{186}}$

$\frac{a(1-r^n)}{1-r} \rightarrow \frac{6\left(1-\left(-\frac{1}{2^2}\right)^{95}\right)}{1-\left(-\frac{1}{2^2}\right)} = \frac{6\left(1+\frac{1}{2^{190}}\right)}{5} = \frac{24\left(1+\frac{1}{2^{190}}\right)}{5} = \frac{24(2^{190}+1)}{5 \cdot 2^{190}}$

✓ $\frac{6(2^{190}+1)}{5 \cdot 2^{188}}$