DM homework 6 (23 февраля 2016 г.)

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Problem 1.

a. $1, -\frac{1}{3}, \frac{1}{9}$

b. $0, 2, 2$

c. $0, 4, 4$

Problem 2.

a. 20

b. 11

c. $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} = \frac{15}{8}$

d. $\frac{10}{11}$

Problem 3.

a. 576

b. 1

c. $\frac{1}{2}$

d. $\frac{43}{5}$

Problem 4.

a. $\sum_{i=1}^{k+1} i^3$

b. $\sum_{k=1}^{m+1} \frac{k}{k+1}$

c. $\sum_{m=0}^{n+1} (m+1)2^m$

d. $\sum_{k=1}^{n} 2(3k^2+4) + 5(2k^2-1)$

e. $\prod_{k=1}^{n} \frac{k}{k+2}$

Problem 5.

a. $\sum_{i=1}^{7}(-1)^{i+1}i^2$

b. $\prod_{i=2}^{4}(i^2-1)$

c. $\sum_{i=2}^{6}(-1)^i \frac{i}{(i+1)(i+2)}$

d. $\prod_{i=1}^{4}(1-t^i)$

Problem 6.

a. $\sum_{j=0}^{n-2} \frac{j+1}{(n-j-1)^2}$

b. $\prod_{j=n-1}^{2n-1} \frac{n-j}{n+j+1}$

Problem 7.
Prove that $\frac{4(4^{k+1}-16)}{3} = \frac{4(4^k-16)}{3} + 4^{k+1}$.
$\frac{4(4^k-16)}{3} + 4^{k+1} = \frac{4(4^k+3(4^k)-16)}{3} = \frac{4(4^{k+1}-16)}{3}$

Problem 8.
It's true for $k = 1$, let's prove that $\frac{1}{(2k+2)!} = \frac{1}{(2(k-1)+2)!}\frac{1}{2k+1}\frac{1}{2k+2}$
$\frac{1}{(2(k-1)+2)!}\frac{1}{2k+1}\frac{1}{2k+2} = \frac{1}{(2k)!}\frac{1}{2k+1}\frac{1}{2k+2} = \frac{1}{(2k)!(2k+1)(2k+2)} = \frac{1}{(2k+2)!}$

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