Homework Assignment #0

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MAD 3107: Discrete Mathematics

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Create a document that has the following items. In problem 8, insert your own graphic or picture.

1. A 6 x 6 box with a title row

x	1	2	3	4	5
1	1	2	3	4	5
2	2	4	0	2	4
3	3	0	3	0	3
4	4	2	0	4	2
5	5	4	3	2	1

2. Find the sum of $\sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^n$

   We can make this look better inline: $\displaystyle\sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^n$

   Or make it standout, centered, on its own line

$$\sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^n$$

3. aligned equations, numbered and not numbered

$$\begin{aligned}(a+b)^2 &= (a+b)(a+b)\\ &= a^2+ab+ba+b^2\\ &= a^2+2ab+b^2\end{aligned}$$

$$\begin{aligned}(a+b)^2 &= (a+b)(a+b) &(1)\\ &= a^2+ab+ba+b^2 &(2)\\ &= a^2+2ab+b^2 &(3)\end{aligned}$$

4. Using the hint, we find $\alpha^n = \alpha^{n-1} + \alpha^{n-2}$ and $\beta^n = \beta^{n-1} + \beta^{n-2}$. We proceed by indcution on n.
   $n = 1$ Then $f_1 = 1 = \dfrac{\alpha^1 - \beta^1}{\alpha - \beta}$. So it is true for $n = 1$
   Assume the statement is true for all $i, 1 \leq i \leq k$ and show it is true for $k + 1$.

$$\begin{aligned} f_{k+1} &= f_k + f_{k-1} \\ &= \frac{\alpha^k - \beta^k}{\alpha - \beta} + \frac{\alpha^{k-1} - \beta^{k-1}}{\alpha - \beta} \\ &= \frac{\alpha^k + \alpha^{k-1} - (\beta^k + \beta^{k-1})}{\alpha - \beta} \\ &= \frac{\alpha^{k+1} - \beta^{k+1}}{\alpha - \beta} \end{aligned}$$

   Hence, $f_n = \dfrac{\alpha^n - \beta^n}{\alpha - \beta}$ for all $n \in \mathbb{N}$.

5. Create a 3 x 4 matrix.
   Use bmatrix

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -4 \\ 0 & 0 & 1 & \sqrt{2} \end{bmatrix}$$

6. Create an itemized list with an itemized sublist.

   (a) Level 2.

      i. Level 3

      ii. Level 3

         - Now we just get bullet points
         - again

7. I can type ***bold and italicized text***,
   Let x $\in \mathbb{N}$. Then is

   - x $\in \mathbb{R} \cup \mathbb{C}$
   - x $\notin \mathbb{R}^-$
   - $(A \cup B) \cap C =?$

8. Take a picture of yourself and insert it here. Be sure to upload your picture file with your tex and pdf files.