



Staple!

Moda  
MAA4226 MAA5228

## Home-B

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Touch: 6May2016

**Hello.** Our take-home slid completely under my office door. by **4PM of Tuesday, 23Nov2010.** Please write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

**B1:** Show no work. Fill-in *all* blanks on this sheet! (*Handwriting is fine; don't bother to type*).

**a** For natural number  $K$ , the sum

$$\sum_{n=3}^{3+K} 4^n$$

.....

**b**  $\sum_{n=1}^{\infty} r^n = \frac{5}{8}$ . So  $r =$  ..... or **DNE**.

[Hint: The sum starts with  $n$  at **one**, not zero.]

**c**  $\sum_{n=3}^{\infty} \left[ \frac{1+2i}{3} \right]^n =$  ..... +  $[i \cdot$  ..... ].

**d** The Mac of  $\frac{5}{1-x^3}$  has RoC= ..... .  
Mac( $x$ )= ..... .

Write the first 5 non-zero terms,

e.g.  $8x^3 + \frac{1}{8}x^6 + \frac{3}{2}x^8 - x^{12} - 7x^{15} + \dots$ .

**e** Writing poly  $p(x) := 5 - 3x + 77x^2 + 9x^3 + 5x^4$  as  $\sum_{k=0}^4 C_k \cdot [x-1]^k$ , coeff  $C_3$  is in: Circle one interval  
( $-\infty, -70$ ),  $[-70, -15]$ ,  $[-15, -8]$ ,  $[-8, -1]$ ,  $[-1, 8]$ ,  
 $[8, 15]$ ,  $[15, 30]$ ,  $[30, 75]$ ,  $[75, 94]$ ,  $[94, +\infty)$ .

*Essay questions: For each question, carefully type a triple-spaced essay solving the problem.*

**B2:** A fnc  $f \in \text{Diff}^2(\mathbb{R} \rightarrow \mathbb{R})$  with  $f(7) = 0$  and  $f'(7) = 0$ , satisfies

†:  $f'' + f = \mathbf{0}$ . [I.e, the zero-fnc.]

Prove that  $f = \mathbf{0}$ , using Taylor's thm, as follows:

First, show that  $f \in \mathbf{C}^\infty$ . Then, for a *fixed*  $x_0 \in \mathbb{R}$ , argue that  $|f(x_0)|$  is as small as desired, by upper-bounding with Taylor-remainder terms from Our Taylor's pamphlet on the Teaching Page.

[Hint: Use TAYTHM-2 on page 2 of the pamphlet.]

End of Home-B

**B1:** ..... 125pts

**B2:** ..... 85pts

Poorly stapled, or missing ordinals : ..... -5pts

Missing names, or honor sigs : ..... -5pts

**Total:** ..... 210pts

Ord: .....

Ord: .....

Ord: .....

**HONOR CODE:** *"I have neither requested nor received help on this exam other than from my team-mates and my professor (or his colleague)." Name/Signature/Ord*

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