AMS JOURNAL SAMPLE

AUTHOR ONE AND AUTHOR TWO

This paper is dedicated to our advisors.

ABSTRACT. This paper is a sample prepared to illustrate the use of the American Mathematical Society's LaTeX document class `amsart` and publication-specific variants of that class for AMS-LaTeX version 2.

Theorem. Ratio Test (1) $\left(\lim n \to \infty \left|\frac{a_{n+1}}{a_n}\right| = L < 1\right) \Rightarrow (\sum_{n=0}^{\infty} a_n \ absolutely\ converges)\ Proof. Using the direct proof, \lim$ $L \quad (L<1) \Leftrightarrow \forall\, \varepsilon > 0,\ \exists\, N \in \mathbb{N}\ such\ that \left|\left|\frac{a_{n+1}}{a_n}\right| - L\right| < \varepsilon,\ for\ every\ n > N That is, for every \varepsilon > 0, there exists a large number, N \in \mathbb{N}, such that \left|\left|\frac{a_{n+1}}{a_n}\right| - L\right| < \varepsilon \quad for\ n = N+1,\ N+2, \cdots \Leftrightarrow L - \varepsilon < \left|\frac{a_{n+1}}{a_n}\right| < L+\varepsilon \quad for\ n = N+1,\ N+2, \cdots Since this equation is always true for every \varepsilon, choose its value \varepsilon = \frac{1-L}{2} > 0 Now we have a true statement (hypothesis), for\ n = N+1,\ N+2, \cdots L - \frac{1-L}{2} < \left|\frac{a_{n+1}}{a_n}\right| < L + \frac{1-L}{2} \Leftrightarrow \frac{3L-1}{2} < \left|\frac{a_{n+1}}{a_n}\right| < \frac{L+1}{2} \left(\left|\frac{a_{n+1}}{a_n}\right| > 0\ is\ true\right) \bigwedge \left(\frac{L+1}{2} < 1\ is\ true\right) \Rightarrow \forall\, n > N,\ \ max\left\{0,\ \frac{3L-1}{2}\right\} < \left|\frac{a_{n+1}}{a_n}\right| < \frac{L+1}{2} < 10 < \frac{L+1}{2} < 1 n = N+1, \quad \left|\frac{a_{N+2}}{a_{N+1}}\right| < \frac{L+1}{2} \Leftrightarrow |a_{N+2}| < \frac{L+1}{2}|a_{N+1}| n = N+2, \quad \left|\frac{a_{N+3}}{a_{N+2}}\right| < \frac{L+1}{2} \Leftrightarrow |a_{N+3}| < \frac{L+1}{2}|a_{N+2}| < \left(\frac{L+1}{2}\right)^2 |a_{N+1}| n = N+3, \quad \left|\frac{a_{N+4}}{a_{N+3}}\right| < \frac{L+1}{2} \Leftrightarrow |a_{N+4}| < \frac{L+1}{2}|a_{N+3}| < \left(\frac{L+1}{2}\right)^2 |a_{N+2}| < \left(\frac{L+1}{2}\right)^3 |a_{N+1}| \vdots$

Therefore, we can construct the following inequality, $\sum_{n=0}^{\infty} |a_n| = (|a_0| + \cdots + |a_N|) + (|a_{N+1}| + |a_{N+2}| + |a_{N+3}| + |a_{N+4}|$ $(|a_1| + \cdots + |a_N|) + \left\{|a_{N+1}| + \frac{L+1}{2}|a_{N+1}| + \left(\frac{L+1}{2}\right)^2 |a_{N+1}| + \left(\frac{L+1}{2}\right)^3 |a_{N+1}| + \cdots\right\} = (|a_1| + \cdots + |a_N|) + |a_{N+1}| \left\{1 + \frac{L+1}{2} + \left(\frac{L+1}{2}\right)^2 + \left(\frac{L+1}{2}\right)^3 + \cdots\right\} = (|a_1| + \cdots + |a_N|) + |a_{N+1}| \left\{\frac{1}{1-\left(\frac{L+1}{2}\right)}\right\} = \left(\sum_{n=0}^{N} |a_n|\right) + |a_{N+1}| \left(\frac{2}{1-L}\right) \sum_{n=0}^{\infty} |a_n| < \sum_{n=0}^{N} |a_n| + |a_{N+1}| \left(\frac{2}{1-L}\right) Since the infinite sum is bounded and monotonic, it converges by the monot$ $(\sum_{n=0}^{\infty} a_n \ absolutely\ converges)$ $\square Also, we have to consider the following two different hypotheses. \lim n \to \infty \left|\frac{a_{n+1}}{a_n}\right| = L > 1 \quad and \quad \lim$

Theorem. Ratio Test (2) $\left(\lim n \to \infty \left|\frac{a_{n+1}}{a_n}\right| = L > 1\right) \Rightarrow (\sum_{n=0}^{\infty} a_n \ diverges)\ We can prove the Ratio Test (2) same as we did i$

Theorem. Ratio Test (3) $\left(\lim n \to \infty \left|\frac{a_{n+1}}{a_n}\right| = 1\right) \Rightarrow (\sum_{n=0}^{\infty} a_n \ is\ inconclusive)\ Try to prove it. (Choose any positive value fo$

Exercise. Test the series by using the Ratio Test.

1. $\sum_{n=1}^{\infty} (-1)^n \frac{n^4}{3^{n+2}}$
2. $\sum_{n=1}^{\infty} \frac{1}{n!}$

Date: January 1, 2001 and, in revised form, June 22, 2001.
2020 *Mathematics Subject Classification.* Primary 54C40, 14E20; Secondary 46E25, 20C20.
Key words and phrases. Differential geometry, algebraic geometry.
The first author was supported in part by NSF Grant #000000.
Support information for the second author.

3. $\sum_{n=1}^{\infty} \frac{\cos(n\pi/3)}{n!}$
4. $\sum_{n=1}^{\infty} \frac{1}{n}$
5. $\sum_{n=0}^{\infty} \frac{\sqrt{n}}{n^2+1}$
6. $\sum_{n=1}^{\infty} \frac{n^n}{n!}$

This is an unnumbered first-level section head

This is an example of an unnumbered first-level heading.

THIS IS A SPECIAL SECTION HEAD

This is an example of a special section head[1].

1. This is a numbered first-level section head

This is an example of a numbered first-level heading.

1.1. **This is a numbered second-level section head.** This is an example of a numbered second-level heading.

This is an unnumbered second-level section head. This is an example of an unnumbered second-level heading.

1.1.1. *This is a numbered third-level section head.* This is an example of a numbered third-level heading.

This is an unnumbered third-level section head. This is an example of an unnumbered third-level heading.

Lemma 1.1. *Let $f, g \in A(X)$ and let E, F be cozero sets in X.*

(1) *If f is E-regular and $F \subseteq E$, then f is F-regular.*
(2) *If f is E-regular and F-regular, then f is $E \cup F$-regular.*
(3) *If $f(x) \geq c > 0$ for all $x \in E$, then f is E-regular.*

The following is an example of a proof.

Proof. Set $j(\nu) = \max(I \backslash a(\nu)) - 1$. Then we have

$$\sum_{i \notin a(\nu)} t_i \sim t_{j(\nu)+1} = \prod_{j=0}^{j(\nu)} (t_{j+1}/t_j).$$

Hence we have

$$\begin{aligned} \prod_{\nu} \Big(\sum_{i \notin a(\nu)} t_i \Big)^{|a(\nu-1)|-|a(\nu)|} &\sim \prod_{\nu} \prod_{j=0}^{j(\nu)} (t_{j+1}/t_j)^{|a(\nu-1)|-|a(\nu)|} \\ &= \prod_{j \geq 0} (t_{j+1}/t_j)^{\sum_{j(\nu) \geq j} (|a(\nu-1)|-|a(\nu)|)}. \end{aligned} \tag{1.1}$$

By definition, we have $a(\nu(j)) \supset c(j)$. Hence, $|c(j)| = n - j$ implies (5.4). If $c(j) \notin a$, $a(\nu(j))c(j)$ and hence we have (5.5). $\square$

[1] Here is an example of a footnote. Notice that this footnote text is running on so that it can stand as an example of how a footnote with separate paragraphs should be written.

And here is the beginning of the second paragraph.

This is an example of an 'extract'. The magnetization M_0 of the Ising model is related to the local state probability $P(a) : M_0 = P(1) - P(-1)$. The equivalences are shown in Table **??**.

TABLE 1.

	$-\infty$	$+\infty$
$f_+(x,k)$	$e^{\sqrt{-1}kx} + s_{12}(k)e^{-\sqrt{-1}kx}$	$s_{11}(k)e^{\sqrt{-1}kx}$
$f_-(x,k)$	$s_{22}(k)e^{-\sqrt{-1}kx}$	$e^{-\sqrt{-1}kx} + s_{21}(k)e^{\sqrt{-1}kx}$

Definition 1.2. This is an example of a 'definition' element. For $f \in A(X)$, we define

$$\mathcal{Z}(f) = \{E \in Z[X] : f \text{ is } E^c\text{-regular}\}. \tag{1.2}$$

Remark 1.3. This is an example of a 'remark' element. For $f \in A(X)$, we define

$$\mathcal{Z}(f) = \{E \in Z[X] : f \text{ is } E^c\text{-regular}\}. \tag{1.3}$$

Example 1.4. This is an example of an 'example' element. For $f \in A(X)$, we define

$$\mathcal{Z}(f) = \{E \in Z[X] : f \text{ is } E^c\text{-regular}\}. \tag{1.4}$$

Exercise 1.5. This is an example of the `xca` environment. This environment is used for exercises which occur within a section.

The following is an example of a numbered list.

(1) First item. In the case where in G there is a sequence of subgroups

$$G = G_0, G_1, G_2, \ldots, G_k = e$$

such that each is an invariant subgroup of G_i.

(2) Second item. Its action on an arbitrary element $X = \lambda^\alpha X_\alpha$ has the form

$$[e^\alpha X_\alpha, X] = e^\alpha \lambda^\beta [X_\alpha X_\beta] = e^\alpha c^\gamma_{\alpha\beta} \lambda^\beta X_\gamma, \tag{1.5}$$

  (a) First subitem.

$$-2\psi_2(e) = c^\delta_{\alpha\gamma} c^\gamma_{\beta\delta} e^\alpha e^\beta.$$

  (b) Second subitem.

    (i) First subsubitem. In the case where in G there is a sequence of subgroups

$$G = G_0, G_1, G_2, \ldots, G_k = e$$

    such that each subgroup G_{i+1} is an invariant subgroup of G_i and each quotient group G_{i+1}/G_i is abelian, the group G is called *solvable*.

    (ii) Second subsubitem.

  (c) Third subitem.

(3) Third item.

Here is an example of a cite. See [**A**].

Theorem 1.6. *This is an example of a theorem.*

Theorem 1.7 (Marcus Theorem)**.** *This is an example of a theorem with a parenthetical note in the heading.*

FIGURE 1. This is an example of a figure caption with text.

FIGURE 2.

2. Some more list types

This is an example of a bulleted list.

- $\mathcal{J}_g$ of dimension $3g-3$;
- $\mathcal{E}_g^2 = \{$Pryms of double covers of $C = \square$ with normalization of C hyperelliptic of genus $g-1\}$ of dimension $2g$;
- $\mathcal{E}_{1,g-1}^2 = \{$Pryms of double covers of $C = \square_{P^1}^H$ with H hyperelliptic of genus $g-2\}$ of dimension $2g-1$;
- $\mathcal{P}_{t,g-t}^2$ for $2 \leq t \leq g/2 = \{$Pryms of double covers of $C = \square_{C''}^{C'}$ with $g(C') = t-1$ and $g(C'') = g-t-1\}$ of dimension $3g-4$.

This is an example of a 'description' list.

Zero case: $\rho(\Phi) = \{0\}$.
Rational case: $\rho(\Phi) \neq \{0\}$ and $\rho(\Phi)$ is contained in a line through 0 with rational slope.
Irrational case: $\rho(\Phi) \neq \{0\}$ and $\rho(\Phi)$ is contained in a line through 0 with irrational slope.

References

[1] T. Aoki, *Calcul exponentiel des opérateurs microdifferentiels d'ordre infini.* I, Ann. Inst. Fourier (Grenoble) **33** (1983), 227–250.
[2] R. Brown, *On a conjecture of Dirichlet*, Amer. Math. Soc., Providence, RI, 1993.
[3] R. A. DeVore, *Approximation of functions*, Proc. Sympos. Appl. Math., vol. 36, Amer. Math. Soc., Providence, RI, 1986, pp. 34–56.

Department of Mathematics, Louisiana State University, Baton Rouge, Louisiana 70803
Current address: Department of Mathematics and Statistics, Case Western Reserve University, Cleveland, Ohio 43403
Email address: `xyz@math.university.edu`

Mathematical Research Section, School of Mathematical Sciences, Australian National University, Canberra ACT 2601, Australia
Email address: `two@maths.univ.edu.au`