## ACROSS

1. Like some avengers
2. Like show horses' feet
3. Marines ranked just above Pvts.
4. Pain reliever brand
5. Source of protein for vegetarians
6. The E in QED
*17. 2006 (Australian)
7. Constellation whose principal star is Vega
8. Signal used to find shipwrecks
9. Type of plane transformation
*22. 1950 (French)
10. Gawk at
11. Align the crosshairs
12. Willy of "Free Willy"
13. "Skinny Legs ___": 1990 Tom Robbins novel
14. Common ending of chemical sugars
15. What the answers to all of the starred clues are
16. Birth mo. of Euler
17. Solvent formed when a hydroxyl group is protonated
18. Style of jazz singing
19. Auguste Chevalier, to Evariste Galois
20. Colt's mother
*45. 1954 (French)
21. Ends of prayers
22. Widely used text: "Abstract Algebra" by Dummit \& $\qquad$
23. Writer/director Ephron
*56. 2010 (Vietnamese)
24. Gas or elec., e.g.
25. "Alas!"
26. Computer operators
27. Gets
28. Snake's sound
29. Sri $\qquad$

## DOWN

1. Schroedinger's pet in a box
2. It comes in Pale and Brown varieties
3. Each
4. WALL-E's love
5. Adjective that describes the set $\mathbb{Q}$ vis-a-vis the set $\mathbb{R}$, e.g.
6. Surgical tube
7. "It's $\qquad$ heck in here!"
8. Saint Joan
9. Twosome
10. Denzel Washington movie: "The Taking of $\qquad$ 123 "
11. Appliance with an oil vat and basket
12. Unit of mass and gold purity
13. Premium cable channel
14. Not pro
15. Term for bad, watered down beer
16. Bath sponge
17. "Get $\qquad$ !"
18. Stomach malady
19. Like some numbers
20. Islamic equivalent of kosher
21. Computer scheme for character-encoding
22. Weekly music magazine in the UK
23. This can be used to identify whether a system of eqns. has a soln.
24. Mathematician and pioneering computer scientist Lovelace, credited with writing the first ever computer program
25. Algebraic geometer Zariski, 1981 Wolf Prize winner
26. Drummer with Lennon and McCartney
27. Cosmetician Lauder
28. Reduces the amplitude of an oscillating system
29. "Woe $\qquad$ !"
30. $\qquad$ of Mathematics: bimonthly journal published in Princeton
31. Two-faced Roman god who is an eponym for a month
32. Express dismay or elation, for instance
33. Eagle's home
34. Run of letters towards the beginning of the alphabet
35. You'll find infinitely many of these in the Hilbert Hotel
36. Judges' wear
37. Greek letter used to denote the Dirichlet function that is the alternating version of the series expression for the Riemann zeta function
38. Asian capital, and the location of the 2014 ceremony to recognize more 37-Across
39. Slangy "no"
40. Jefferson Davis was its Pres.
41. Rooster's partner
42. Noah built one in the Bible
43. Home country of eleven 37-Across, to date (abbr.)

# Award Winners 

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Clues are at left, on page 360 . The solution is on page 402.
Extra copies of the puzzle, in both .pdf and .puz (AcrossLite) formats, can be found at the MAGAZINE's website, or (temporarily) at http://www .mathematicsmagazine. org.

A1046. Because $\int_{a}^{b} f(x) d x=0$, it follows that

$$
\int_{a}^{b} x f(x) d x=\int_{a}^{b}\left(x-\frac{a+b}{2}\right) f(x) d x
$$

By the Triangle Inequality for Integrals and the bound $|f(x)| \leq M$,

$$
\begin{aligned}
\left|\int_{a}^{b} x f(x) d x\right| & =\left|\int_{a}^{b}\left(x-\frac{a+b}{2}\right) f(x) d x\right| \\
& \leq \int_{a}^{b}\left|x-\frac{a+b}{2}\right||f(x)| d x \leq M \int_{a}^{b}\left|x-\frac{a+b}{2}\right| d x \\
& =2 M \int_{a}^{(a+b) / 2}\left(\frac{a+b}{2}-x\right) d x=\frac{M(b-a)^{2}}{4}
\end{aligned}
$$

Solution to puzzle on page 360

| C | A | P | E | D |  | S | H | O | D |  | P | F | C | S |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| A | L | E | V | E |  | T | 0 | F | U |  | E | R | A | T |
| T | E | R | E | N | C | E | T | A | 0 |  | L | Y | R | A |
|  |  |  |  | S | O | N | A | R |  | S | H | E | A | R |
| L | A | U | R | E | N | T | S | C | H | W | A | R | T | Z |
| O | G | L | E |  |  |  |  |  | A | I | M |  |  |  |
| $\bigcirc$ | R | C | A |  | A | N | D | A | L | L |  | 0 | S | E |
| F | I | E | L | D | S | M | E | D | A | L | 1 | S | T | S |
| A | P | R |  | A | C | E | T | A | L |  | S | C | A | T |
|  |  |  | A | M | 1 |  |  |  |  |  | M | A | R | E |
| J | E | A | N | P | 1 | E | R | R | E | S | E | R | R | E |
| A | M | E | N | S |  | F | 0 | O | T | E |  |  |  |  |
| N | O | R | A |  | N | G | O | B | A | 0 | C | H | A | U |
| U | T | 1 | L |  | A | H | M | E |  | U | S | E | R | S |
| S | E | E | S |  | H | 1 | S | S |  | L | A | N | K | A |

