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- Institute ## # '& PS Withite State 12 PK stitute \$ 15 th Multille # # # 'S PE 1. The monic polynomial f has rational coefficients and is irreducible over the rational numbers. If $f(\sqrt{5}+\sqrt{2})=0$, compute $f(f(\sqrt{5}-\sqrt{2}))$. (A polynomial is *monic* if its leading coefficient is 1. A polynomial is *irreducible* over the rational numbers if it cannot be expressed $x^2 - 2$ is irreducible, but $x^2 - 1 = (x + 1)(x - 1)$ is not.) as a product of two polynomials with rational coefficients of positive degree. For example, ute the the utte wark
- 2. In the following diagram, points E, F, G, H, I, and J lie on a circle. The triangle ABC has side lengths AB = 6, BC = 7, and CA = 9. The three chords have lengths EF = 12, withthe the the the 面射机机械样等除 GH = 15, and IJ = 16. Compute $6 \cdot AE + 7 \cdot BG + 9 \cdot CI$. 而如此此教林著 matine # ** matinu m # '3

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3. Compute the number of ways of tiling the 2×10 grid below with the three tiles shown. There 面动机机都林塔路 is an infinite supply of each tile, and rotating or reflecting the tiles is not allowed. Towithit the the town matinte # # Institute # # '\$

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