

SQ2016 MAT 21C

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1. [12.2.54] Vectors are drawn from the center of a regular  $n$ -sided polygon in the plane to the vertices of the polygon. Show that the sum of the vectors is zero. (Hint: What happens to the sum if you rotate the polygon about its center?)

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2. [12.3.40] Find an equation for the line through  $P(1, 3)$  parallel to  $\mathbf{v} = 3\mathbf{i} - 2\mathbf{j}$ . Then sketch the line. Include  $\mathbf{v}$  in your sketch as a vector starting at the origin. (Hint: The vector  $\mathbf{v} = a\mathbf{i} + b\mathbf{j}$  is parallel to the line  $bx - ay = c$ .)

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3. [12.5.74] **Hidden lines in computer graphics** Your eye is at  $(4, 0, 0)$ . You are looking at a triangular plate whose vertices are at  $(1, 0, 1)$ ,  $(1, 1, 0)$ , and  $(-2, 2, 2)$ . The line segment from  $(1, 0, 0)$  to  $(0, 2, 2)$  passes through the plate. What portion of the line segment is hidden from your view by the plate? (This is an exercise in finding intersections of lines and planes.)

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4. [13.2.24] **Beaming electrons** An electron in a TV tube is beamed horizontally at a speed of  $5 \times 10^6$  m/sec toward the face of the tube 40 cm away. About how far will the electron drop before it hits?

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5. [14.1.67] Find and sketch the domain of

$$f(x, y) = \int_x^y \frac{d\theta}{\sqrt{1 - \theta^2}}.$$

Then find an equation for the level curve or surface of the function passing through the point  $(0, 1)$ .