Solutions

2.1

- $\nabla T = (6x, 2y, 4z) = (6, 2, 4)$; $|\nabla T| = 7.483$ K/m.
- $\mathbf{q} = -40\nabla T = (-240, -80, -160)$ W/m2; $|\mathbf{q}| = 40 \times 7.483 = 299.3$ W/m2.

2.2

- Far faces at 3: $9 \times 4 = 36$ each, 108; near faces at 1: $1 \times 4 = 4$ each, 12: net 96.
- $\int 2(x + y + z)\, dV = 2 \times 6 \times 8 = 96$.

2.3

- $\nabla \times \mathbf{G} = (x, -y, 0)$; at (1,1,2): $(1, -1, 0)$.

2.4

- Open surface: the theorem does not apply directly.
- Repair: patch the hole, apply the theorem, subtract the patch.

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