1. Perform the division below. Then, find the intervals that correspond to the quotient in the form $ax^2 + bx + c$ and remainder r.

$$\frac{6x^3 - 44x^2 + 78x - 42}{x - 5}$$

A. $a \in [29, 31]$, $b \in [-200, -180]$, $c \in [1046, 1053]$, and $r \in [-5284, -5281]$.

B. $a \in [1, 9]$, $b \in [-22, -18]$, $c \in [-6, -1]$, and $r \in [-52, -48]$.

C. $a \in [29, 31]$, $b \in [105, 114]$, $c \in [605, 612]$, and $r \in [2996, 3000]$.

D. $a \in [1, 9]$, $b \in [-15, -11]$, $c \in [7, 10]$, and $r \in [-5, 1]$.

E. $a \in [1, 9]$, $b \in [-78, -69]$, $c \in [446, 453]$, and $r \in [-2284, -2280]$.

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2. Factor the polynomial below completely. Then, choose the intervals the zeros of the polynomial belong to, where $z_1 \leq z_2 \leq z_3$. *To make the problem easier, all zeros are between -5 and 5.*

$$f(x) = 9x^3 - 39x^2 - 38x + 40$$

A. $z_1 \in [-5.71, -4.64]$, $z_2 \in [-1.73, -1.3]$, and $z_3 \in [-0.12, 0.88]$

B. $z_1 \in [-5.71, -4.64]$, $z_2 \in [-0.95, -0.49]$, and $z_3 \in [1.32, 1.78]$

C. $z_1 \in [-0.77, -0.7]$, $z_2 \in [1.35, 1.77]$, and $z_3 \in [4.58, 5.7]$

D. $z_1 \in [-1.84, -1.03]$, $z_2 \in [0.29, 1.21]$, and $z_3 \in [4.58, 5.7]$

E. $z_1 \in [-5.71, -4.64]$, $z_2 \in [-0.25, -0.11]$, and $z_3 \in [3.93, 4.41]$

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3. What are the *possible Integer* roots of the polynomial below?

$$f(x) = 5x^2 + 7x + 7$$

A. All combinations of: $\dfrac{\pm 1, \pm 7}{\pm 1, \pm 5}$

B. $\pm 1, \pm 7$

C. All combinations of: $\dfrac{\pm 1, \pm 5}{\pm 1, \pm 7}$

D. $\pm 1, \pm 5$

E. There is no formula or theorem that tells us all possible Integer roots.

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4. Factor the polynomial below completely, knowing that $x-4$ is a factor. Then, choose the intervals the zeros of the polynomial belong to, where $z_1 \leq z_2 \leq z_3 \leq z_4$. *To make the problem easier, all zeros are between -5 and 5.*

$$f(x) = 20x^4 - 127x^3 + 134x^2 + 261x - 180$$

A. $z_1 \in [-4.12, -3.66]$, $z_2 \in [-3.42, -2.89]$, $z_3 \in [-0.77, -0.16]$, and $z_4 \in [0.87, 2.6]$

B. $z_1 \in [-1.79, -1.07]$, $z_2 \in [0.06, 1.02]$, $z_3 \in [2.86, 3.08]$, and $z_4 \in [3.18, 4.97]$

C. $z_1 \in [-0.87, -0.59]$, $z_2 \in [1.61, 1.77]$, $z_3 \in [2.86, 3.08]$, and $z_4 \in [3.18, 4.97]$

D. $z_1 \in [-4.12, -3.66]$, $z_2 \in [-3.42, -2.89]$, $z_3 \in [-0.35, 0.12]$, and $z_4 \in [4.84, 5.17]$

E. $z_1 \in [-4.12, -3.66]$, $z_2 \in [-3.42, -2.89]$, $z_3 \in [-1.8, -1.43]$, and $z_4 \in [0.32, 1.06]$

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5. Perform the division below. Then, find the intervals that correspond to the quotient in the form $ax^2 + bx + c$ and remainder r.

$$\frac{8x^3 + 28x^2 - 32}{x + 3}$$

A. $a \in [-28, -22], b \in [94, 105], c \in [-301, -299]$, and $r \in [860, 871]$.

B. $a \in [-28, -22], b \in [-50, -41], c \in [-138, -130]$, and $r \in [-431, -422]$.

C. $a \in [6, 10], b \in [0, 5], c \in [-17, -9]$, and $r \in [2, 14]$.

D. $a \in [6, 10], b \in [-9, 0], c \in [15, 18],$ and $r \in [-101, -93]$.

E. $a \in [6, 10], b \in [50, 54], c \in [153, 159],$ and $r \in [432, 441]$.
