1. 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.*

$$f(x) = 6x^3 - 35x^2 + 19x + 30$$

A. $z_1 \in [-6.9, -4.8]$, $z_2 \in [-1.6, -1]$, and $z_3 \in [0.55, 0.79]$

B. $z_1 \in [-6.9, -4.8]$, $z_2 \in [-0.8, 0.1]$, and $z_3 \in [1.17, 1.62]$

C. $z_1 \in [-6.9, -4.8]$, $z_2 \in [-3.3, -2.4]$, and $z_3 \in [0.12, 0.51]$

D. $z_1 \in [-0.8, 0]$, $z_2 \in [1, 2]$, and $z_3 \in [4.83, 5.67]$

E. $z_1 \in [-2.6, -0.9]$, $z_2 \in [0.6, 1.3]$, and $z_3 \in [4.83, 5.67]$

---

2. Factor the polynomial below completely, knowing that $x+2$ 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.*

$$f(x) = 12x^4 + 89x^3 + 204x^2 + 172x + 48$$

A. $z_1 \in [0.58, 0.81]$, $z_2 \in [0.39, 0.88], z_3 \in [1.13, 2.21]$, and $z_4 \in [3.58, 4.06]$

B. $z_1 \in [-4.27, -3.23]$, $z_2 \in [-2.33, -1.98], z_3 \in [-1.09, 0.1]$, and $z_4 \in [-1.03, -0.6]$

C. $z_1 \in [0.88, 1.82]$, $z_2 \in [1.25, 1.93], z_3 \in [1.13, 2.21]$, and $z_4 \in [3.58, 4.06]$

D. $z_1 \in [-0.39, 0.57]$, $z_2 \in [1.97, 2.62], z_3 \in [1.13, 2.21]$, and $z_4 \in [3.58, 4.06]$

E. $z_1 \in [-4.27, -3.23]$, $z_2 \in [-2.33, -1.98], z_3 \in [-1.52, -1.19]$, and $z_4 \in [-2.73, -0.78]$

---

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

$$f(x) = 4x^4 + 3x^3 + 7x^2 + 3x + 6$$

A. All combinations of: $\dfrac{\pm1, \pm2, \pm3, \pm6}{\pm1, \pm2, \pm4}$

B. All combinations of: $\dfrac{\pm1, \pm2, \pm4}{\pm1, \pm2, \pm3, \pm6}$

C. $\pm1, \pm2, \pm4$

D. $\pm1, \pm2, \pm3, \pm6$

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

---

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

$$\frac{12x^3 - 59x^2 - 25x + 104}{x - 5}$$

A. $a \in [11, 14],\ b \in [-121, -116],\ c \in [562, 576],$ and $r \in [-2753, -2741]$.

B. $a \in [57, 63],\ b \in [-362, -352],\ c \in [1769, 1775],$ and $r \in [-8753, -8742]$.

C. $a \in [11, 14],\ b \in [-16, -9],\ c \in [-70, -64],$ and $r \in [-173, -171]$.

D. $a \in [57, 63],\ b \in [236, 244],\ c \in [1175, 1183],$ and $r \in [5999, 6009]$.

E. $a \in [11, 14],\ b \in [-1, 2],\ c \in [-25, -12],$ and $r \in [3, 6]$.

---

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

$$\frac{9x^3 - 27x - 16}{x - 2}$$

A. $a \in [4, 11], b \in [15, 22], c \in [4, 10],$ and $r \in [-1, 3]$.

B. $a \in [4, 11], b \in [-21, -16], c \in [4, 10],$ and $r \in [-37, -33]$.

C. $a \in [13, 22], b \in [35, 40], c \in [43, 52],$ and $r \in [67, 75]$.

D. $a \in [13, 22], b \in [-40, -35], c \in [43, 52],$ and $r \in [-109, -101]$.

E. $a \in [4, 11], b \in [6, 10], c \in [-23, -16],$ and $r \in [-37, -33]$.