Find the zeros of the function below.

(1) $f(x) = x^3 + 2x^2 - 11x - 12$

"roots"

***To start, let's list the possible rational zeros for this function.**

possible rational zeros: $\frac{\text{factors of } 12}{\text{factors of } 1} = \pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

Now, let's find a zero by plugging our possibilities into the function.

$f(3) = 0$

Now that we've found a zero, use synthetic division to divide our polynomial down to a quadratic. From there, we'll solve as usual.

$$\begin{array}{r|rrrr} 3 & 1 & 2 & -11 & -12 \\ & & 3 & 15 & 12 \\ \hline & 1 & 5 & 4 & 0 \end{array}$$

$x^2 + 5x + 4 = 0$

$(x + 4)(x + 1) = 0$

$x + 4 = 0$

$x = -4, -1$

$x = 3, -4, -1$

Find all the zeros of the function.

(2) $f(x) = 2x^3 - 5x^2 - 2x + 5$

$1, 5/2, -1$

possible rational zeros: $\dfrac{\pm 1, \pm 5}{\pm 1, \pm 2} = \pm 1, \pm \frac{1}{2}, \pm 5, \pm \frac{5}{2}$

$$\begin{array}{r|rrrr} 1 & 2 & -5 & -2 & 5 \\ & & 2 & -3 & -5 \\ \hline & 2 & -3 & -5 & 0 \end{array}$$

$2x^2 - 3x - 5 = 0$

$(2x-5)(x+1) = 0$

$2x-5=0$

$2x=5$

$x = 5/2, -1$

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① $\pm 1, \pm 2, \pm 4$

$\dfrac{\text{factors of constant term}}{\text{factors of leading coef}}$

②
$$\begin{array}{r|rrrrr} -1 & 1 & 2 & 5 & 8 & 4 \\ & & -1 & -1 & -4 & -4 \\ \hline & 1 & 1 & 4 & 4 & 0 \end{array}$$

Yes

remainder $= 0$

$f(-1) = 0$

(11)

$$\begin{array}{r|rrr|r} 2 & 1 & -8 & 5 & 14 \\ & & 2 & -12 & -14 \\ \hline & 1 & -6 & -7 & 0 \end{array}$$

$x = 2, 7, -1$

$x^2 - 6x - 7 = 0$

$(x-7)(x+1) = 0$