

September 18

## Synthetic Division

(EX1)  $(x^3 + 2x^2 - x - 2) \div (x - 1)$   
dividing                      dividing by

Step 1: Set what you are dividing by equal to zero and solve.

$$\begin{array}{r|l} x - 1 = 0 & \\ +1 & +1 \\ \hline & x = 1 \end{array}$$

Step 2: Put that number in a box.

Step 3: Line up coefficients from what you are dividing next to box. Skip a line and draw a horizontal line.

$$\begin{array}{r|rrrr} & 1 & 2 & -1 & -2 \\ & \downarrow + & \downarrow + & \downarrow + & \downarrow + \\ 1 & 0 & 1 & 3 & 2 \\ & \nearrow & \nearrow & \nearrow & \\ & 1 & 3 & 2 & 0 \end{array}$$

↑  
Remainder

Step 4: Add column. Put answer below line.

Step 5: Multiply number below line with number in box. Put answer in next column above line.

Step 6: Repeat until all columns are filled.

Step 7: Write answer using numbers below line as coefficients. Start variables one exponent less than what you were dividing.

$$1x^2 + 3x + 2$$

$$\boxed{x^2 + 3x + 2}$$

Ex2  $(2v^3 - 20v^2 + 56v - 41b) \div (v - b)$

$$\begin{array}{r|l} v - b & \neq 0 \\ \hline & +b \\ \hline v & \neq b \end{array}$$

$$\begin{array}{r} b \overline{) 2 \quad -20 \quad 56 \quad -41b} \\ \underline{0 \quad 12 \quad -48 \quad 48} \\ 2 \quad -8 \quad 8 \quad \textcircled{2} \leftarrow R \\ \hline \boxed{2v^2 - 8v + 8 + \frac{2}{v-b}} \end{array}$$

Ex3  $(5b^4 + 8b^3 - 3b^2 + 2b + 7) \div (b + 4)$

$$\begin{array}{r|l} b+4 & \neq 0 \\ \hline & -4 \\ \hline b & \neq -4 \end{array}$$

$$\begin{array}{r} -4 \overline{) 5 \quad 8 \quad -3 \quad 2 \quad 7} \\ \underline{0 \quad -20 \quad 48 \quad -180 \quad 712} \\ 5 \quad -12 \quad 45 \quad -178 \quad \textcircled{719} \leftarrow R \\ \hline \boxed{5b^3 - 12b^2 + 45b - 178 + \frac{719}{b+4}} \end{array}$$