Synthetic Substitution Practice

Solutions

$f(x) = x^3 - 7x^2 + 7x + 15$

$f(2) = 9$ so this graph contains the point $(2,9)$

$$
\begin{array}{r|rrrr}
2 & 1 & -7 & 7 & 15 \\
  &   & 2 & -10 & -6 \\
\hline
  & 1 & -5 & -3 & 9
\end{array}
$$

remember that this
result is just the
y-coordinate

Factor using Synthetic Division

$$f(x)=x^3-7x^2+7x+15$$

$$\begin{array}{r|rrrr} -1 & 1 & -7 & 7 & 15 \\ & & -1 & 8 & -15 \\ \hline & 1 & -8 & 15 & 0 \end{array}$$

$(x+1)(x^2-8x+15)$

$(x+1)(x-3)(x-5)$

x-intercepts at

$(-1,0)$ $(3,0)$ and $(5,0)$

Factor using Synthetic Division

$$f(x) = 2x^3 - 11x^2 + 2x + 15$$

$$\begin{array}{c|cccc} -1 & 2 & 11 & 2 & 15 \\ & & -2 & 13 & -15 \\ \hline & 2 & -13 & 15 & 0 \end{array}$$

$$(x+1)(2x^2 - 13x + 15)$$

$$(x+1)(2x-3)(x-5)$$

x-intercepts at

$$(-1,0)\left(\tfrac{3}{2},0\right)(5,0)$$

Factor using Synthetic Division

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

$$\begin{array}{r|rrrr} 2 & 1 & 0 & -3 & -2 \\ & \downarrow & 2 & 4 & 2 \\ \hline & 1 & 2 & 1 & 0 \end{array}$$

$(x-2)(x^2+2x+1)$

$(x-2)(x+1)^2 \Rightarrow$ x-intercepts at $(-1,0)$ and $(2,0)$

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

Show that there is an x-intercept between $x = -2$ and $x = -1$

$$\begin{array}{r|rrrr} -2 & 1 & -2 & 0 & 5 \\ & & -2 & 8 & -16 \\ \hline & 1 & -4 & 8 & -11 \end{array}
\qquad
\begin{array}{r|rrrr} -1 & 1 & -2 & 0 & 5 \\ & & -1 & 3 & -3 \\ \hline & 1 & -3 & 3 & 2 \end{array}$$

$(-2, -11)$ $\qquad$ $(-1, 2)$

between
$x = -2$ and $x = -1$
the graph has to cross 0
to get from $y = -11$ to $y = 2$