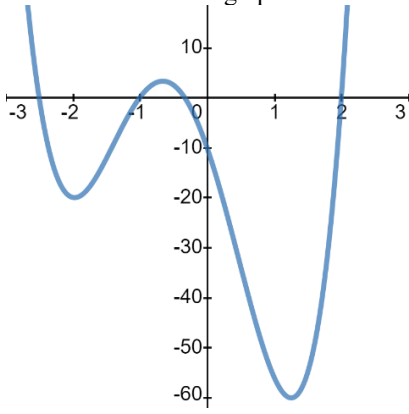
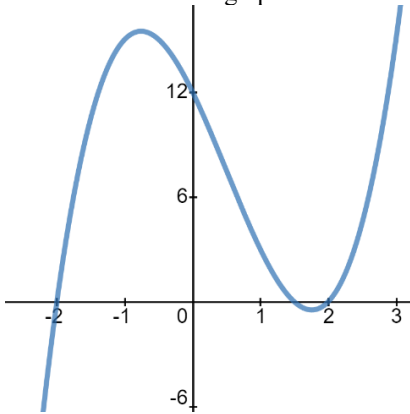


Homework 4.2

$f(x) = 6x^4 + 11x^3 - 24x^2 - 39x - 10$	$g(x) = 2x^3 - 3x^2 - 8x + 12$
<p>1. Make a list of all the possible rational roots of $f(x)$.</p> <p>PRR = $\frac{\pm 1, \pm 2, \pm 5, \pm 10}{\pm 1, \pm 2, \pm 3, \pm 6}$</p>	<p>4. Make a list of all the possible rational roots of $g(x)$.</p> <p>PRR = $\frac{\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12}{\pm 1, \pm 2}$</p>
<p>2. Which of the possible rational roots from above appear to be actual roots based on the graph?</p>  <p>HPRR = $-5/2, -1, -1/3, 2$</p>	<p>5. Which of the possible rational roots from above appear to be actual roots based on the graph?</p>  <p>HPRR = $-2, 3/2, 2$</p>
<p>3. Use synthetic division to find the actual roots of $f(x)$.</p> $\begin{array}{r rrrrr} 2 & 6 & 11 & -24 & -39 & -10 \\ & & 12 & 46 & 44 & 10 \\ \hline & 6 & 23 & 22 & 5 & 0 \\ -1 & & & & & \\ \hline & 6 & 17 & 5 & & 0 \\ -5/2 & & & & & \\ \hline & 6 & 2 & & & 0 \end{array}$ <p>$f(x) = (x-2)(x+1)(x+5/2)(6x+2)$</p> $\begin{aligned} 6x+2 &= 0 \\ 6x &= -2 \\ x &= -1/3 \end{aligned}$ <p>Roots: $-5/2, -1, -1/3, 2$</p>	<p>6. Use synthetic division to find the actual roots of $g(x)$.</p> $\begin{array}{r rrrr} -2 & 2 & -3 & -8 & 12 \\ & & -4 & 14 & -12 \\ \hline & 2 & -7 & 6 & 0 \\ 2 & & & & \\ \hline & 2 & -3 & & 0 \\ 3/2 & & & & \\ \hline & 2 & 3 & & 0 \\ & & & & \\ \hline & 2 & & & 0 \end{array}$ <p>$g(x) = (x+2)(x-2)(x-3/2) \cdot 2$</p> <p>Roots: $-2, 3/2, 2$</p>

A table of values for a polynomial function, $h(x)$, defined by the equation $h(x) = ax^3 + 5x^2 - 12x + c$. The only roots of $h(x)$ lie on the interval $-3 < x < 2$.

x	-3	-2	-1	0	1	2
$h(x)$	-77	0	15	4	3	48

7. Based on the values in the table, can it be determined that $a > 0$ or $a < 0$? Give a reason for your choice.

$$\begin{aligned} \lim_{x \rightarrow \infty} h(x) &= \infty \\ \therefore a &> 0 \end{aligned}$$

8. What is the value of c in the equation of $h(x)$? Give a reason for your answer.

The y -coordinate of the y -intercept is the same as the constant term.
 $h(x)$ has y -intercept of $(0, 4)$, thus $c = 4$.

9. Find the value of a using the fact that $h(1) = 3$. Show your work.

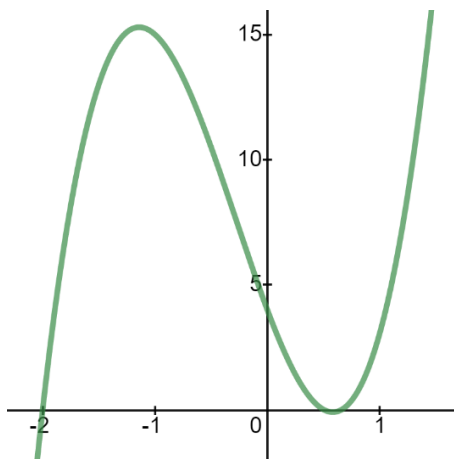
$$\begin{aligned} h(x) &= ax^3 + 5x^2 - 12x + 4 \\ 3 &= a(1)^3 + 5(1)^2 - 12(1) + 4 \\ 3 &= a + 5 - 12 + 4 \\ 3 &= a - 3 \\ \boxed{6} &= a \end{aligned}$$

10. Make a list of all the possible rational roots of $h(x)$ now that the values of a and c are known. Then, investigate the graph and identify which three possible rational roots are the most probable rational roots.

$$PRR = \frac{\pm 1, \pm 2, \pm 4}{\pm 1, \pm 2, \pm 3, \pm 6}$$

$$HPRR = -2, \frac{1}{2}, \frac{2}{3}$$

11. Use synthetic division to show that the most probable roots you identified in question 10 are, in fact, rational roots of $h(x)$.



$$\begin{array}{r} \boxed{-2} \quad \begin{array}{r} 6 \quad 5 \quad -12 \quad 4 \\ 0 \quad -12 \quad 14 \quad -4 \\ \hline 6 \quad -7 \quad 2 \quad 0 \end{array} \\ \boxed{\frac{1}{2}} \quad \begin{array}{r} 6 \quad -7 \quad 2 \quad 0 \\ 0 \quad 3 \quad -2 \\ \hline 6 \quad -4 \quad 0 \end{array} \\ \boxed{\frac{2}{3}} \quad \begin{array}{r} 6 \quad -4 \quad 0 \\ 0 \quad 4 \\ \hline 6 \quad 0 \end{array} \end{array}$$

$$h(x) = (x+2)\left(x-\frac{1}{2}\right)\left(x-\frac{2}{3}\right) \cdot 6$$

$$\boxed{\text{Roots} = -2, \frac{1}{2}, \frac{2}{3}}$$