

1. (a) Divide:

$$\frac{x^3 - x^2 + 2x - 2}{x - 1}$$

$$\begin{array}{r}
 x^2 + 2 \quad \text{Remainder } 0 \\
 x-1 \overline{) x^3 - x^2 + 2x - 2} \\
 \underline{-(x^3 - x^2)} \quad \downarrow \quad \downarrow \\
 0 + 0 \quad 2x - 2 \\
 \underline{-(2x - 2)} \\
 0 + 0
 \end{array}$$

(b) Check you work by multiplying.

$$\begin{aligned}
 (x-1)(x^2+2) &= x^3 + 2x - x^2 - 2 \\
 &= \boxed{x^3 - x^2 + 2x - 2}
 \end{aligned}$$

2.

$$h(x) = \frac{6x^2}{(3x+5)(x-4)}$$

(a) Find $h(5)$ and $h(1)$.

$$h(5) = \frac{6 \cdot 5^2}{(3 \cdot 5 + 5)(5 - 4)} = \frac{150}{20} = 7.5$$

$$h(1) = \frac{6 \cdot 1}{(3 \cdot 1 + 5)(1 - 4)} = \frac{6}{-24} = -\frac{1}{4}$$

(b) Find the horizontal asymptotes of $h(x)$.

End behavior:

METHOD 1: Plug in $x=1000$

$$h(1000) = \frac{6 \cdot 1000^2}{3005 \cdot 996} \approx \frac{6000000}{3000000} = 2$$

OR METHOD 2: COMPARE LEADING TERMS

$$h(x) \approx \frac{6x^2}{3x^2 + 7x - 20} \approx \frac{6x^2}{3x^2} = 2$$

(c) Find the vertical asymptotes of $h(x)$.

Set denom. equal to 0.

$$(3x+5)(x-4) = 0$$

$$\begin{aligned} 3x+5 &= 0 & \leftarrow & \quad \rightarrow & x-4 &= 0 \\ \boxed{x = -\frac{5}{3}} & & & & \boxed{x = 4} & \end{aligned}$$

(d) Find the x and y intercepts of $h(x)$.

Set $x=0$ find y -int.

$$f(0) = \frac{6 \cdot 0}{(3 \cdot 0 + 5)(0 - 4)} = \frac{0}{-20} = 0$$

Set $y=0$ find x -int

$$0 = \frac{6x^2}{(3x+5)(x-4)}$$

← Multiply both sides by $(3x+5)(x-4)$ to clear fraction

$$(3x+5)(x-4)(0) = 6x^2$$

$$\frac{0}{6} = \frac{6x^2}{6}$$

$$0 = x^2$$

$$\boxed{x = 0}$$

$$\boxed{(0, 0)}$$

↑ only int.

(d) Graph $h(x)$.

