1. How many times is $x = 4$ a root of $t(x) = x^6 - 17x^5 + 100x^4 - 160x^3 - 640x^2 + 2816x - 3072$

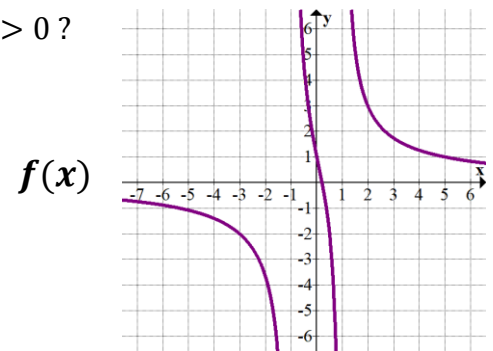2. How many times is $x = -3$ a solution to $x^7 + x^6 - 21x^5 - 5x^4 + 160x^3 - 72x^2 - 432x + 432$?

3. Given the following synthetic chart. What conclusion(s) can be drawn?

$$\begin{array}{r|rrrr} -2 & 3 & -1 & -11 & 6 \\ & & -6 & 14 & 0 \\ \hline & 3 & -7 & 3 & 0 \end{array}$$

a) $x = -2$ is a zero
b) $x = -2$ is an upper bound
c) $x = -2$ is a lower bound
d) $x = -2$ is a factor
e)   No conclusion can be formed

4. The graph of f appears as follows. What is the solution to $f(x) > 0$?
a) $(-1, \infty)$
b) $[-1, \infty)$
c) $(-1, 1) \cup (1, \infty)$
d) $(-1, .2) \cup (1, \infty)$
e) none of these

$f(x)$

5. Solve.
$x^2 - 3x - 18 > 0$

6.   Solve.
$9x^3 - 25x^2 \leq 0$

7. Solve.
$\dfrac{x}{x+2} - \dfrac{2}{x-1} < 0$

8. Solve. Show work including a sign chart. Give your answers as intervals.

$12x^2 + 5x < 2$

9. Solve. Show work including a sign chart. Give your answers as intervals.

$$\frac{x^2 + x - 6}{x} \geq 0$$

10. Solve. Show work including a sign chart. Give your answers as intervals.

$$\frac{x^2 - x - 20}{x^2 - 3x - 18} < 0$$

11. Write the polynomial as the product of linear factors and list all the zeros of the function.

$f(x) = x^6 - x^5 - 15x^4 + 13x^3 + 66x^2 - 40x - 80$

12. Write the polynomial as the product of linear factors and list all the zeros of the function.
$f(x) = 2x^4 + 5x^3 + 4x^2 + 5x + 2$

13. Write the polynomial as the product of linear factors and list all the zeros of the function.
$f(x) = x^4 - 4x^3 + 8x^2 - 16x + 16$

14. Write the polynomial in standard form given the following zeros.
Zeros: $2 + i$ and -5

15. Write the polynomial given the following zeros.
Zeros: -6 and -2 (multiplicity 2)

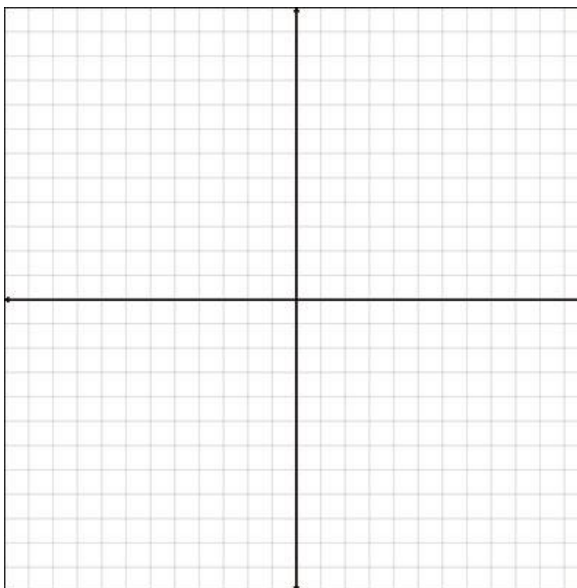16. $f(x) = \frac{x^2 - 2x + 3}{x + 2}$

Hole:

Vertical asymptote:

Horizontal asymptote:

End behavior asymptote:

x – Intercept:

y – Intercept:

Domain:

17. $f(x) = \dfrac{3x^2 - 2x + 4}{x^2 - 4x - 5}$

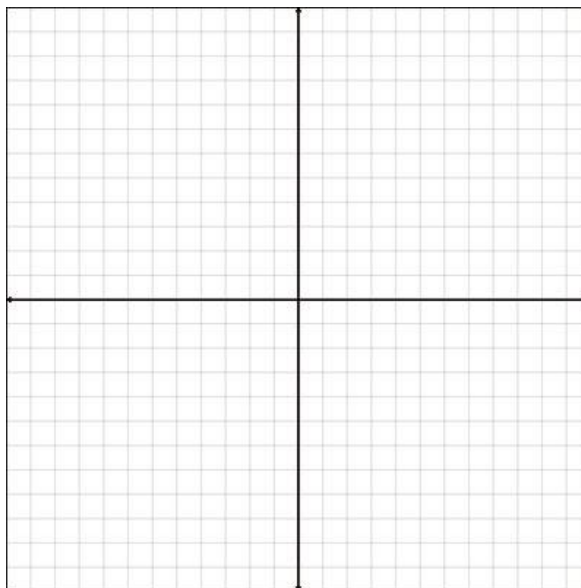Hole:

Vertical asymptote:

Horizontal asymptote:

End behavior asymptote:

x – Intercept:

y – Intercept:

Domain:

18. $f(x) = \dfrac{x^2 + x - 2}{x^2 - 9}$
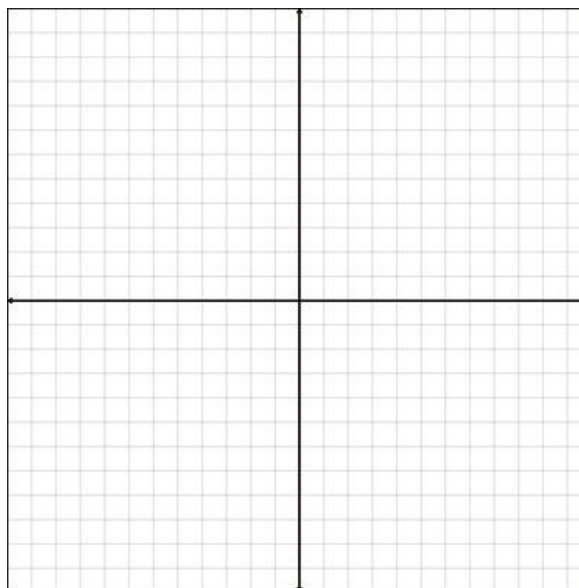
Hole:

Vertical asymptote:

Horizontal asymptote:

End behavior asymptote:

x – Intercept:

y – Intercept:

Domain:

19. $f(x) = \dfrac{3x-3}{x^2-1}$
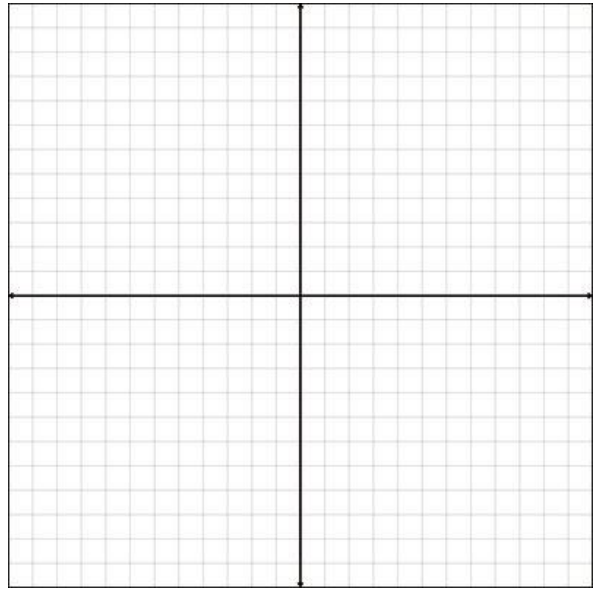
Hole:

Vertical asymptote:

Horizontal asymptote:

End behavior asymptote:

x – Intercept:

y – Intercept:

Domain:

20. $f(x) = \dfrac{6-3x}{x^2-5x+6}$
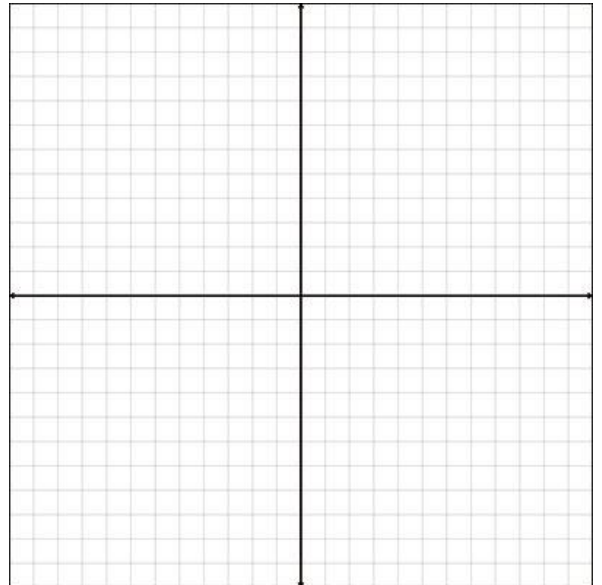
Hole:

Vertical asymptote:

Horizontal asymptote:

End behavior asymptote:

x – Intercept:

y – Intercept:

Domain:

21. Find the end behavior asymptote

a) $h(x) = \dfrac{2x^3+x^2-23x-2}{2x-5}$

b) $f(x) = \dfrac{x^4-2x+1}{x-2}$