<u>Poly n. & Rational Function Review</u>
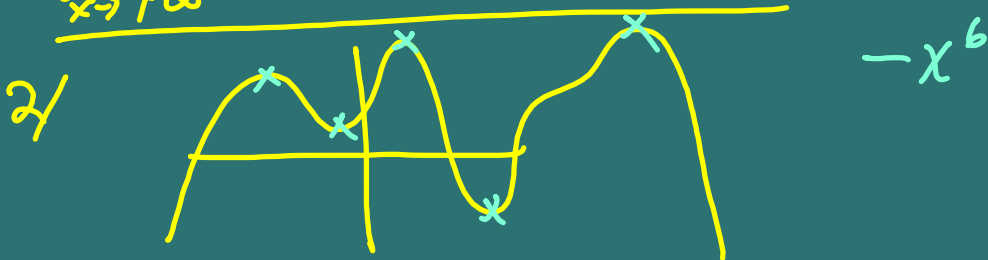
1) $f(x) = -7x^5 + 3x^4 + 2x^2 - 4x + 1$

Odd Degree

$$\lim_{x \to -\infty} f(x) = +\infty$$

$$\lim_{x \to +\infty} f(x) = -\infty$$

2)

$-x^6$

3/ (c) $x^4 + 5x^3 + 9x^2 - 9x - 9 = 0$ $\pm 1 \pm 3 \pm 9$

——————| $x = -1$ O

$\begin{array}{r|rrrr} -1 & 1 & 5 & 9 & -9 & -7 \\ & & -1 & -4 & 0 & 9 \\ \hline + & 1 & 4 & 0 & -9 & 0 \end{array}$

$(x+1)(x^3 + 4x^2 \quad -9)$ $\begin{array}{l} X = 3 \\ X = -3 \end{array}$ $\overset{\smile}{O}$

$\begin{array}{r|rrr} -3 & 1 & 4 & 0 & -9 \\ & & -3 & -3 & 9 \\ \hline & 1 & 1 & -3 & 0 \end{array}$

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

$X = \boxed{-1} \quad X = \boxed{-3} \quad X = \dfrac{-1 \pm \sqrt{1 - 4(1)(-3)}}{2(1)} = \boxed{\dfrac{-1 \pm \sqrt{13}}{2}}$

Roots: $-\frac{2}{5}, \pm 4i$ Find eq.   Use Reverse factoring

$X = -\frac{2}{5}$ $X = 4i$ $X = -4i$

$5x = -2$ $X - 4i = 0$ $X + 4i = 0$
$5x + 2 = 0$

$(5x+2)(x-4i)(x+4i)$

$(5x+2)(x^2 + 16i^2)$ $\begin{array}{l} i = i \\ i^2 = -1 \\ i^3 = -i \\ i^4 = 1 \end{array}$

$5x^3 + 80x + 2x^2 + 32 = 0$

★ 6.

6 a-b) = Factor denom
Multiply by common denom. + cancel
all denoms.
Check for excluded Values

$$\frac{}{x+4} + \frac{}{x-7} = 1$$

6 c-d) <, >

$$x \neq -4, 7$$

1) Set >0 or <0
2) Make common denom
3) Test points

8) Pull out common factors

4/ Calc

5) Roots: $-7, \pm 4i$

$x = -7 \qquad x = 4i \qquad x = -4i$

$(x+7)(x-4i)(x+4i)$

$(x+7)(x^2 + 16i^2)$

$x^3 + 16x + 7x^2 + 112 = 0$

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6 a-b   Multiply by common denom &
          cancel all denom

6 c-d   1) Set < 0 or > 0

          2) Make common denom

          3) Test Points

7) Partial Fractions

$$\frac{}{x^5(x-4)^3} = \frac{A}{x^5} + \frac{B}{x^4} + \frac{C}{x^3} + \frac{D}{x^2} + \frac{E}{x^1} + \frac{F}{(x-4)^3} + \frac{G}{(x-4)^2}$$
$$(x')^5 \qquad\qquad + \frac{H}{(x-4)}$$

7(d) $\dfrac{7x^3 - 8x - 5}{2x^4 - x^2 - 3}$

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

$$\frac{Ax + B}{2x^2 - 3} + \frac{Cx + D}{x^2 + 1}$$

$x^2 + x^1 - 3$

$x^4 \quad x^2 \quad 3$

$x^6 \quad x^3 \quad 3$

$$\overline{x^2(x^3+5)} = \frac{A}{x^2} + \frac{B}{x} + \frac{Cx+D}{x^3+5}$$

8/ Pull out the common factors