Algebra 2 Honors

Unit 5

Review

Evaluate each function at the given value.

$f(n) = 4n^5 - 19n^4 - 24n^3 - 31n^2 - 33n + 18$ at $n = 6$

$4(6)^5 - 19(6)^4 - 24(6)^3 - 31(6)^2$

$-33(6) + 18$

0 $(6, 0)$

6 is a root

$x = 6$

Divide:

13) $(4b^3 - 28b^2 - 3) \div (b - 7)$

$4b^2$

$b-7 \overline{)\,4b^3 - 28b^2 + 0b - 3}$

$-4b^3 + 28b^2$

$0b - 3$

$4b^2 + \frac{-3}{b-7}$

$4b^2 - \frac{3}{b-7}$

$7 \mid 4 \;\; -28 \;\; 0 \;\; -3$

$\downarrow \;\; 28 \;\; 0 \;\; 0$

$4 \;\; 0 \;\; 0 \;\; -3$

$4b^2 - \frac{3}{b-7}$

State if the given binomial is a factor of the given polynomial.

14) $(n^3 - 2n^2 - 30n - 36) \div (n - 7)$ $n - 7 = 0$

$(7)^3 - 2(7)^2 - 30(7) - 36$ $n = 7$

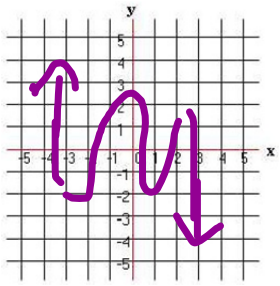
-1

$n - 7$ is not a factor

Sketch the graph of the following functions.

1. a) A quintic function with a -3 for a leading coefficient.
   b) An linear function with a positive leading coefficient.
   c) A polynomial to the 6th degree with a negative leading coefficient.

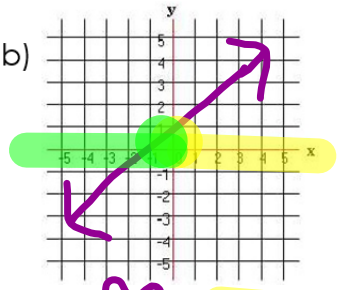
a)



$f(x) \to -\infty$ as $x \to +\infty$

$f(x) \to \infty$ as $x \to -\infty$

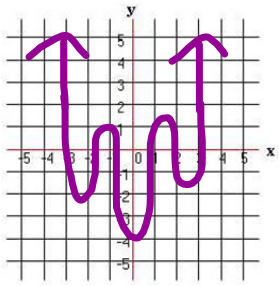
b)



$f(x) \to \infty$ as $x \to +\infty$

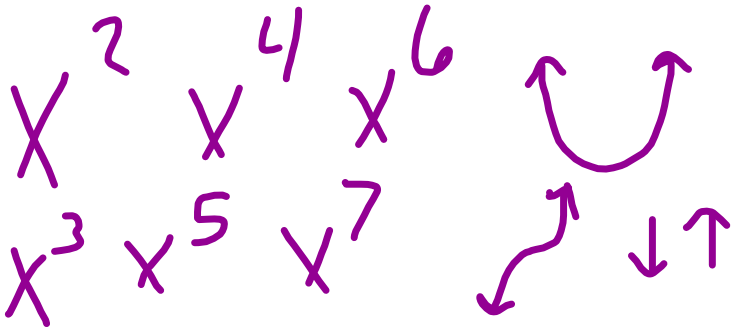
$f(x) \to -\infty$ as $x \to -\infty$

c)



$f(x) \to \infty$ as $x \to +\infty$

$f(x) \to \infty$ as $x \to -\infty$



Determine whether the binomial is a factor of the polynomial P(x) using the factor and the remainder theorem. Show your work for determining your answer.

12. $P(x) = 2x^2 - ix + 1$ $(x + i)$.

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

*use substitution

$x + i = 0$,

$x = -i$

$2i^2 + i^2 + 1$

$2(-1) - 1 + 1$

$-2 - 1 + 1$

-2

$x + i$ is Not a factor

Find all roots. State the multiplicity if necessary.

14. $P(x) = x^4 - 3x^3 - 20x^2 - 24x - 8$

$\pm 1, \pm 2, \pm 4, \pm 8$

$(-1)^4 - 3(-1)^3 - 20(-1)^2 - 24(-1) - 8 = 0$

-1 | 1 | -3 | -20 | -24 | -8
↓ | | -1 | 4 | 16 | 8
1 | -4 | -16 | -8 | 0

$x^3 - 4x^2 - 16x - 8$

-2 | 1 | -4 | -16 | -8
↓ | | -2 | 12 | 8
1 | -6 | -4 | 0

$x^2 - 6x - 4$

$\frac{6 \pm \sqrt{36 - 4(1)(-4)}}{2(1)} = \frac{6 \pm \sqrt{52}}{2}$

$\sqrt{52}$
$\sqrt{4 \cdot 13}$

$\frac{6 \pm 2\sqrt{13}}{2}$

$3 \pm \sqrt{13}, -2, -1$

16. $P(x) = x^3 + 8$

$(x+2)(x^2-2x+4) = 0$

$x+2=0$ $\quad x^2-2x+4=0$

$-2 \quad -2$

$x=-2$ $\quad \dfrac{2 \pm \sqrt{4-4(1)(4)}}{2(1)}$

$\dfrac{2 \pm \sqrt{-12}}{2}$ $\quad i\sqrt{3}$

$2i\sqrt{3}$

$\dfrac{2 \pm 2i\sqrt{3}}{2}$

$x = 1 \pm i\sqrt{3}, -2$

18. $2-\sqrt{3},\ 1+i,\ 1-i$

$2+\sqrt{3}$

$x=2-\sqrt{3}$ $x=2+\sqrt{3}$ $x=1+i$ $x=1-i$

$(x-2+\sqrt{3})(x-2-\sqrt{3})(x-1-i)(x-1+i)$

$x^2-2x-x\sqrt{3}+4+2\sqrt{3}$
$-2x+x\sqrt{3}-3-2\sqrt{3}$

$x^2-x+xi+1-x$
$-x-xi+1-i$
$-1\cdot-1$

(x^2-4x+1) (x^2-2x+2)

$(x^2-4x+1)(x^2-2x+2)$

x= -3 multiplicity 2, i

$x=-3 \quad x=-3 \quad x=i \quad x=-i$

$(x+3)(x+3)(x-i)(x+i)$

$(x^2+6x+9)(x^2+xi-xi-i^2)$

$(x^2+6x+9)(x^2+1)$

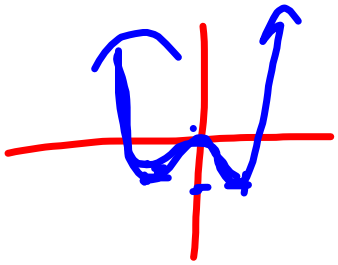
$y = 4x^4 - 4x^2$

y-int $x = 0$ $4(0)^4 - 4(0)^2 = 0$

Min $= -1, -1$

Max $= 0$

Roots $-1, 0, 1$

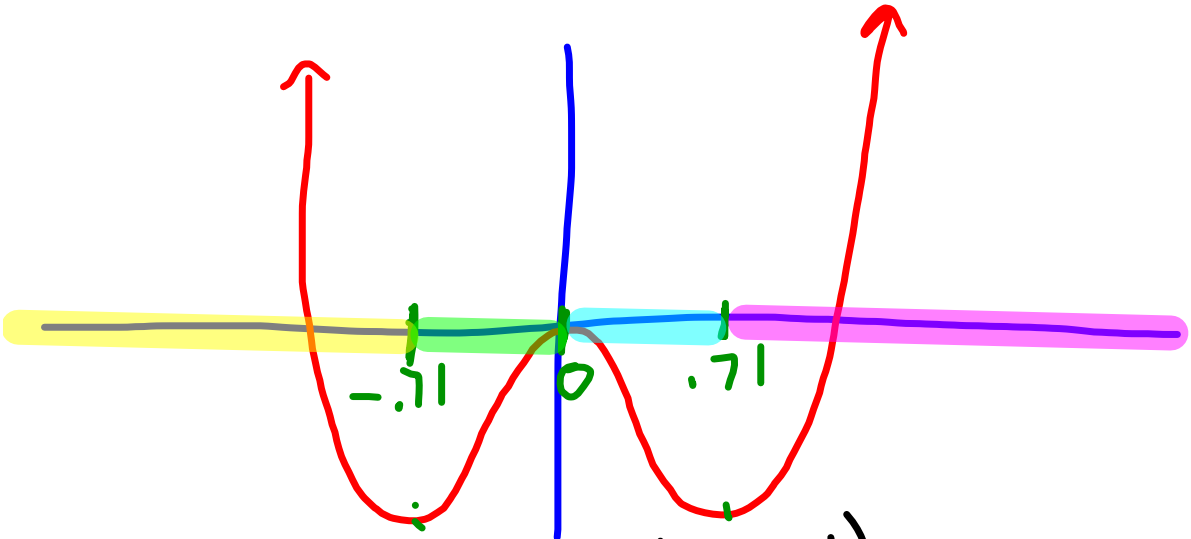


$D\ (-\infty, \infty)$

$R\ [-1, \infty)$

$x \to -\infty \quad f(x) \to \infty$

$x \to \infty \quad f(x) \to \infty$



Dec $(-\infty, -.71) \cup (0, .71)$

Inc $(-.71, 0) \cup (.71, \infty)$