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Date _____
Algebra II

Polynomial Graphs/Remainder Theorem Review Sheet

1. Consider the end behavior description below.

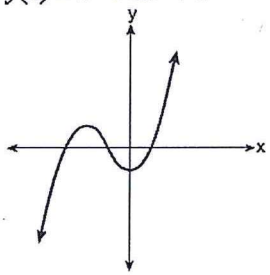
- as $x \to -\infty$, $f(x) \to \infty$ (left up)
- as $x \to \infty$, $f(x) \to -\infty$ (right down)

Which function satisfies the given conditions?

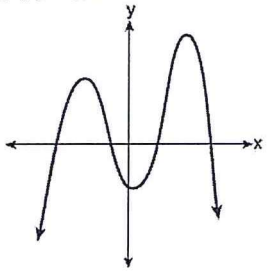
1) $f(x) = x^4 + 2x^2 + 1$ pos even

3) $f(x) = -x^3 + 2x - 6$ negative odd

2)



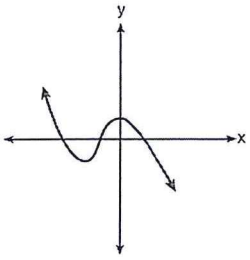
4)



2. Which graph has the following characteristics?

- three real zeros
- as $x \to -\infty$, $f(x) \to -\infty$ (left down)
- as $x \to \infty$, $f(x) \to \infty$ (right up)

1)



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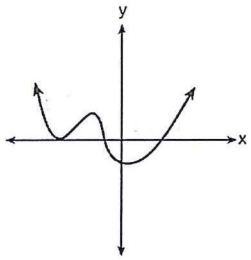

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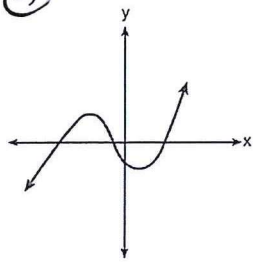

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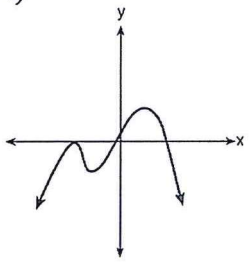
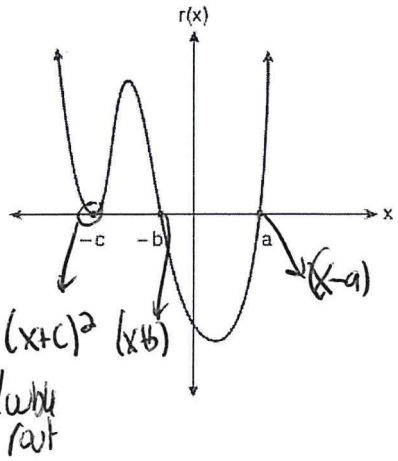


3. A sketch of $r(x)$ is shown below.



An equation for $r(x)$ could be

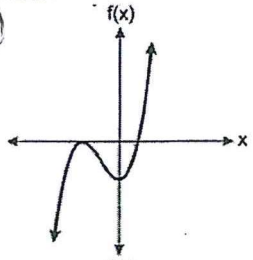
1) $r(x) = (x-a)(x+b)(x+c)$
2) $r(x) = (x+a)(x-b)(x-c)^2$
3) $r(x) = (x+a)(x-b)(x-c)$
4) $r(x) = (x-a)(x+b)(x+c)^2$

double root

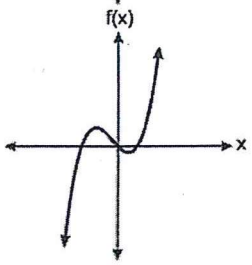
opens up ↑ + ↗ −a ↗ b

4. Which graph best represents the graph of $f(x) = (x+a)^2(x-b)$, where a and b are positive real numbers?

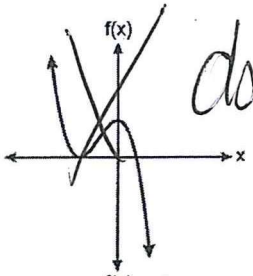
1)



2)

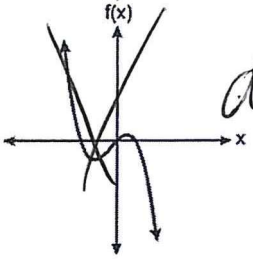


3)



doesn't open up

4)

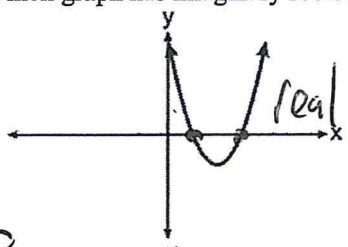


doesn't open up

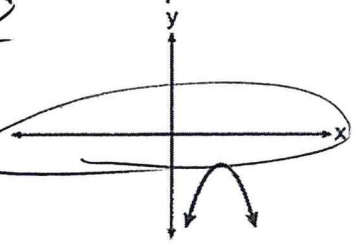
5. Which graph has imaginary roots?

imaginary roots don't hit the x-axis

1)

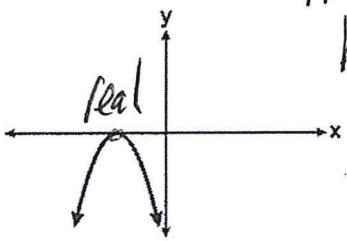


2)

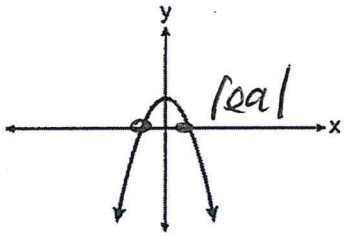


imaginary

3)



4)



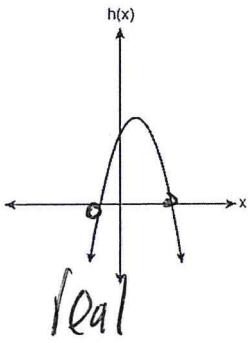
6. Which quadratic functions have imaginary roots?

1) $h(x)$ only

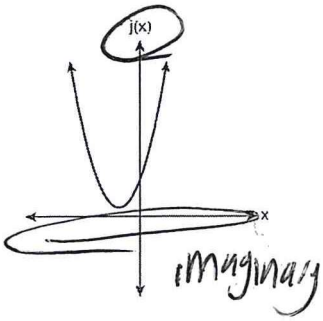
2) $j(x)$ only

3) Both $j(x)$ and $h(x)$

4) Neither $j(x)$ or $h(x)$



real



imaginary

7. Is $x-6$ a factor of x^3-6x^2+4x-1? Explain your answer.

$P(6)=(6)^3-6(6)^2+4(6)-1$ No, the remainder is not 0.

$P(6)=23$

8. Is $x+2$ a factor of $p(x)=x^3-3x^2-8x+4$? Explain your answer.

$P(-2)=(-2)^3-3(-2)^2-8(-2)+4$ Yes, the remainder is 0.

$P(-2)=0$

9. Which binomial is *not* a factor of the expression $x^3-6x^2-49x-66$?

1) $x-11$ $P(11)=0$
2) $x+2$ $P(-2)=0$
3) $x+6$ $P(-6)=-204$
4) $x+3$ $P(-3)=0$

10. Which binomial is a factor of the expression x^3-7x-6?

1) $x+3$ $P(-3)=-12$
2) $x-1$ $P(1)=-12$
3) $x-2$ $P(2)=-12$
4) $x+2$ $P(-2)=0$

11. Given $p(x)=6x^3+31x^2+kx-12$, and $x+4$ is a factor, find the value of k.

$0=6(-4)^3+31(-4)^2+k(-4)-12$

$0=-384+496-4k-12$

$0=-4k+100$

$-100 \quad -100$

$\frac{-100}{-4}=\frac{-4k}{-4}$

$25=k$

-4 is a zero

$(-4,0)$

12. Consider the polynomial $p(x)=x^3+kx-30$. Find a value of k so that $x+3$ is a factor of P.

$0=(-3)^3+k(-3)-30$

$0=-27-3k-30$

$0=-3k-57$

$+57 \quad +57$

$\frac{57}{-3}=\frac{-3k}{-3}$

$-19=k$

-3 is a zero

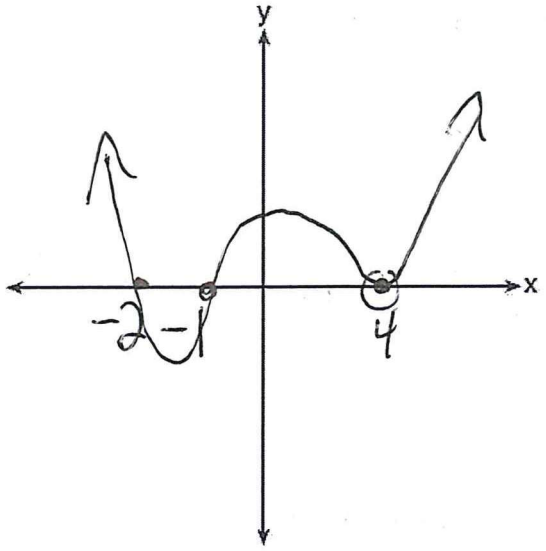
$(-3,0)$

The zeros hit the x-axis
The factors don't

double root

13. Sketch the graph of a polynomial function whose factors are $(x+1)$, $(x-4)^2$, and $(x+2)$.

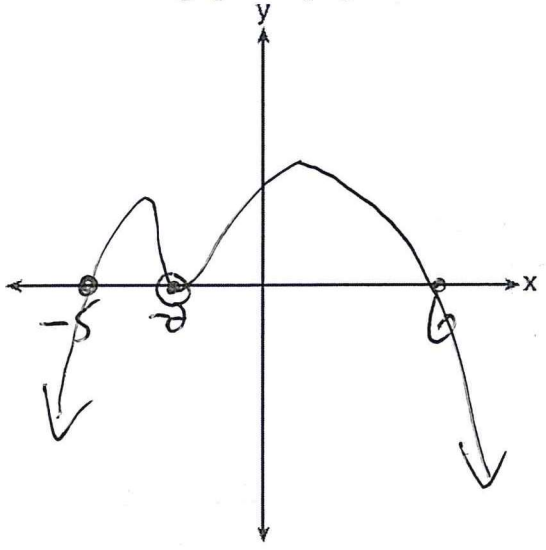
-1, 4, -2



double root

14. Sketch the graph of a polynomial functions whose zeros are -5, -2, -2, and 6.

the zeros hit the x-axis



15. Solve for x: pt

$3x^2 - 4x - 4 = 0$

$x^2 - 4x - 12 = 0$

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

$(x-2)(3x+2) = 0$

$x - 2 = 0$ $\quad +2 \; +2$ $\quad x = 2$

$3x + 2 = 0$ $\quad -2 \quad -2$ $\quad \frac{3x}{3} = \frac{-2}{3}$ $\quad x = \frac{-2}{3}$

16. Solve for x: pt

$6x^2 - 11x - 2 = 0$

$x^2 - 11x - 12$

$(x - \frac{12}{6})(x + \frac{1}{6})$

$(x-2)(6x+1) = 0$

$x - 2 = 0$ $\quad +2 \; +2$ $\quad x = 2$

$6x + 1 = 0$ $\quad -1 \quad -1$ $\quad \frac{6x}{6} = \frac{-1}{6}$ $\quad x = \frac{-1}{6}$

17. Solve for x:

$x^3 + 6x^2 = 4x + 24$

$-4x - 24 \quad -4x - 24$

$x^3 + 6x^2 - 4x - 24 = 0$

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

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

$(x+2)(x-2)(x+6) = 0$

$x+2=0$ $\quad x-2=0$ $\quad x+6=0$

$-2 \; -2$ $\quad +2 \; +2$ $\quad -6 \; -6$

$x = -2$ $\quad x = 2$ $\quad x = -6$

18. Solve for x:

$x^3 - 2x^2 = 9x - 18$

$-9x + 18 \quad -9x + 18$

$x^3 - 2x^2 - 9x + 18 = 0$

$x^2 \quad x^2 - 9 \quad -9$

$x^2(x-2) - 9(x-2) = 0$

$(x^2 - 9)(x-2) = 0$

$(x+3)(x-3)(x-2) = 0$

$x+3=0$ $\quad x-3=0$ $\quad x-2=0$

$-3 \; -3$ $\quad +3 \; +3$ $\quad +2 \; +2$

$x = -3$ $\quad x = 3$ $\quad x = 2$