<u>Sketching Polynomials Practice Worksheet</u>

1. List all possible rational zeros of $P(x) = x^3 + 5x^2 - 4x - 2$.
   a. Use the Rational Zero (Root) Theorem. Find all factors of the constant term and all factors of the leading coefficient. Write them in $\frac{p}{q}$ form below.

   b. Use Synthetic Division or the Remainder Theorem to determine if your $\frac{p}{q}$ values from above are factors of $P(x) = x^3 + 5x^2 - 4x - 2$. Reduce the degree of this polynomial from 3 to 2.

   c. Attempt to factor the remaining degree 2 trinomial. Did it work? What does this mean?

   d. Write out the factored form of $P(x) = x^3 + 5x^2 - 4x - 2$.

   e. Write out all zeros of $P(x) = x^3 + 5x^2 - 4x - 2$ and then sketch the graph of $P(x)$. *Use the Quadratic Formula to find the other zeros.*

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2. List all possible rational zeros of $P(x) = x^4 + 3x^3 - 7x^2 + 9x - 30$.
   a. Use the Rational Zero (Root) Theorem. Find all factors of the constant term and all factors of the leading coefficient. Write them in $\frac{p}{q}$ form below.

   b. Use Synthetic Division or the Remainder Theorem to determine if your $\frac{p}{q}$ values from above are factors of $P(x) = x^4 + 3x^3 - 7x^2 + 9x - 30$. Reduce the degree of this polynomial from 4 to 2. Use the Rational Zero Theorem on your degree 3 polynomial, if necessary *(Try factoring first)*.

   c. Attempt to factor the remaining degree 2 trinomial. Did it work? What does this mean?

   d. Write out the factored form of $P(x) = x^4 + 3x^3 - 7x^2 + 9x - 30$.

   e. Write out all zeros of $P(x) = x^4 + 3x^3 - 7x^2 + 9x - 30$ and then sketch the graph of $P(x)$. *Use the Quadratic Formula to find the other zeros.*

3. Sketch the curve of $P(x) = 2x^4 - x^3 - 26x^2 - 11x + 12$ without a calculator.
   a. Use the Rational Zero (Root) Theorem. Find all factors of the constant term and all factors of the leading coefficient. Write them in $\frac{p}{q}$ form below.

   b. Use Synthetic Division to reduce the degree of this polynomial to degree of 2. Use the Rational Zero Theorem again, if necessary *(Try factoring first)*.

   c. Factor the remaining trinomial using traditional factoring methods.

   d. Write out the factored form of $P(x) = 2x^4 - x^3 - 26x^2 - 11x + 12$.

   e. Write out all zeros of $P(x) = 2x^4 - x^3 - 26x^2 - 11x + 12$ and then sketch the graph of $P(x)$. Clearly show all correct x –intercepts and y –intercepts.

Worksheet: Curve Sketching Extra Practice Precalculus CP

Sketch the following curves (without a calculator).

1. Find the roots/x-intercepts by factoring, synthetic division, etc.
2. Determine the y-intercept from the original equation.
3. Use the parent function to determine the basic shape and end behavior of the graph.
4. Use the Test Point method to check your work.

1. $y = x^2 - 5x - 14$

2. $f(x) = -x^2 - 2x + 15$

3. $y = x^3 - 21x - 20$ if (x+1) is a factor

4. $f(x) = -2x^3 + 7x^2 + 17x - 10$ if x = -2 is a root.

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5. $y=-48x^4+76x^3+116x^2-213x+45$ if $x=3/2$ is a double root.

6. $y=x^5-16x^4+94x^3-240x^2+225x$ if $x=3$ is a double root. (Hint: also find common factor out first).

No Calculator Show work

1. $y = x^3 + 2x^2 - 19x - 20$

x-intercepts: 4 ________

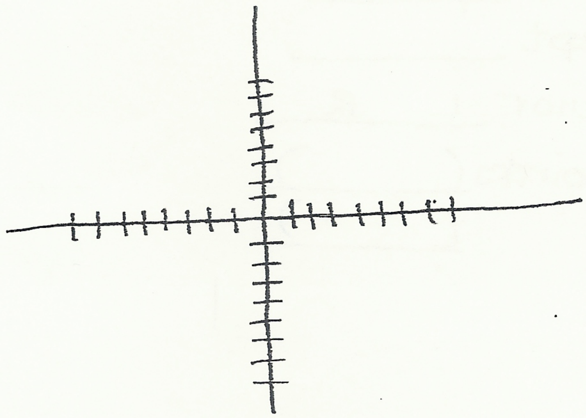
y-intercepts ________

End behavior L R ________

2 extra points ( )

( )

Sketch



2. $y = -(2x-1)(x+2)(x-3)^2$

x-intercepts ________

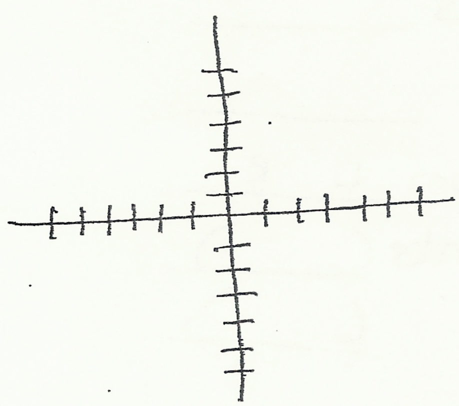
y-intercepts ________

End behavior L R ________

2 extra points ( )

( )

Sketch



No Calculator Show work

1. $y = -x^3 + 13x - 12$

x-intercepts $-4, 1$ ________

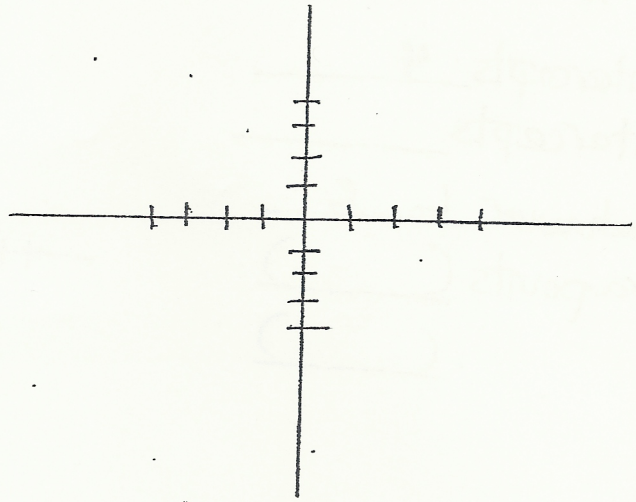
y-intercept ________

End behavior L R ________

2 extrapoints ( )

( )

Sketch



2. $y = (x+2)^2(x+4)(x-2)$

x-intercepts ________

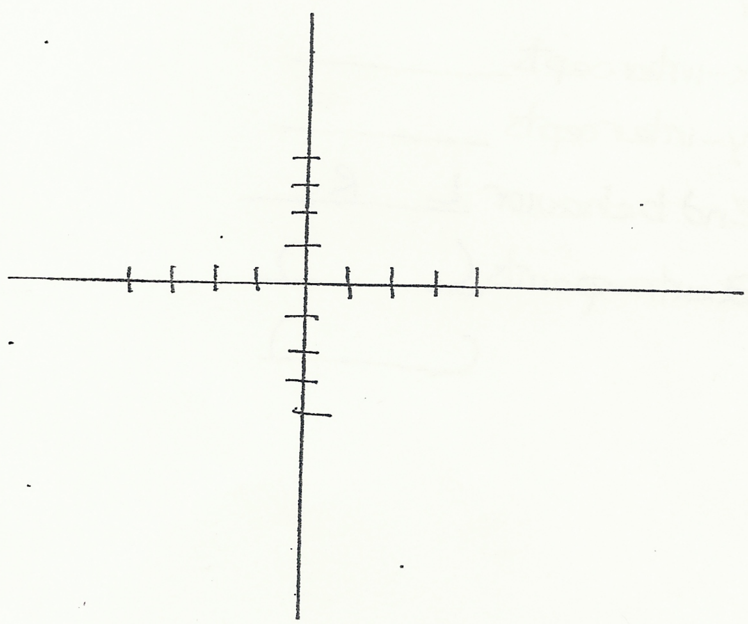
y-intercept ________

End behavior L R ________

2 extrapoints ( )

( )

Sketch



No Calculator Show work

1. $y = x^3 + 2x^2 - 5x - 6$

x-intercepts: -1 ______

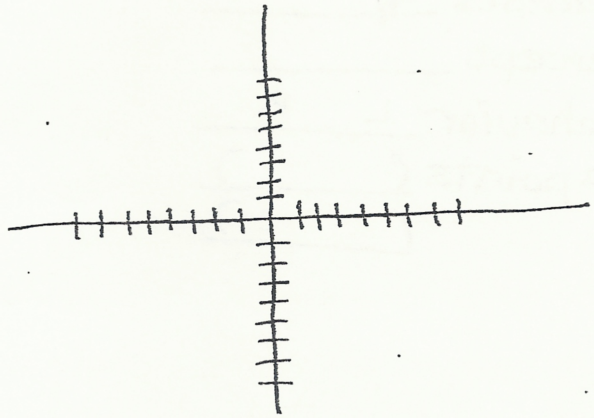
y-intercepts ______

End behavior L R ______

2 extra points (______)

(______)

Sketch



2. $y = -x(x+3)(x-4)^2$

x-intercepts ______

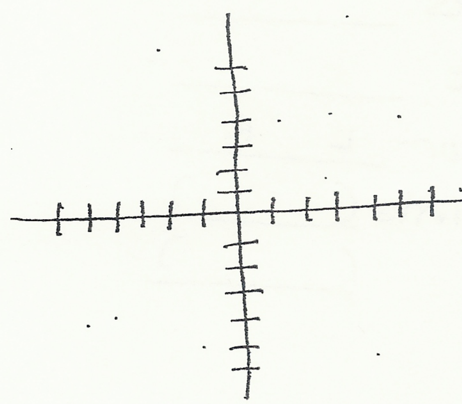
y-intercepts ______

End behavior L R ______

2 extra points (______)

(______)

Sketch



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NO CALCULATOR Show work

1. $y = -x^3 + 12x + 16$

x-intercepts 4, __________

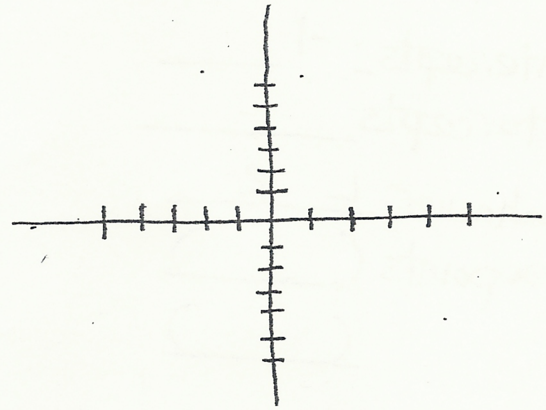
y-intercept __________

End behavior L R

2 extra points ( )

( )

Sketch



2. $y = (x-4)(2x+3)(x-1)^2$

x-intercepts __________

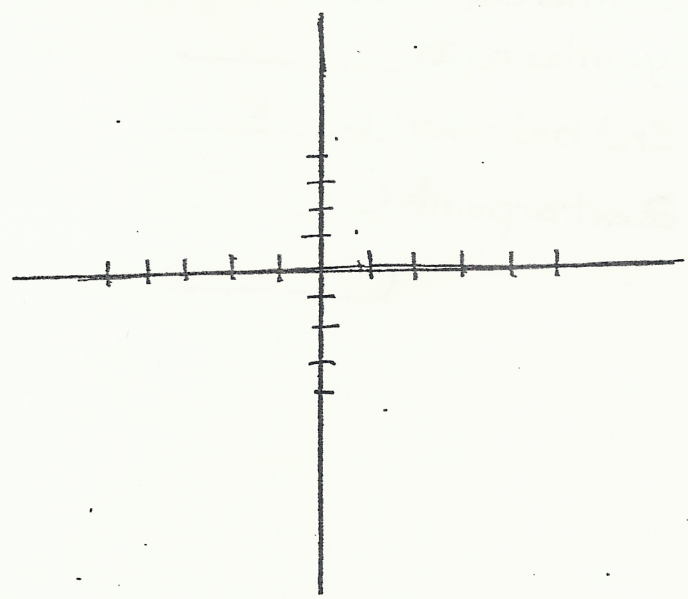
y-intercept __________

End behavior L R

2 extra points ( )

( )

sketch



2-4: Zeros of Polynomials

Precalculus CP

Sketch the following curves **without a calculator**.

a. Find the zeros by using the rational root theorem, factoring and synthetic division.
b. Determine the end behavior and y-intercept from the original equation.
c. Pick additional points to help determine the basic shape of the graph.

1. $f(x) = x^3 - x^2 - 8x + 12$

   x-intercepts: __________

   y-intercept: __________

   End Behavior: __________

   Extra Points: (   )
   (   )

2. $g(x) = x^4 - 4x^3 - x^2 + 16x - 12$

   x-intercepts: __________

   y-intercept: __________

   End Behavior: __________

   Extra Points: (   )
   (   )

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3. $f(x) = 3x^3 - 7x^2 - 22x + 8$

x-intercepts: __________

y-intercept: ___________

End Behavior: _________

Extra Points: (   )
(   )

4. $g(x) = 2x^4 + 9x^3 - 87x^2 - 49x + 45$

x-intercepts: __________

y-intercept: ___________

End Behavior: _________

Extra Points: (   )
(   )