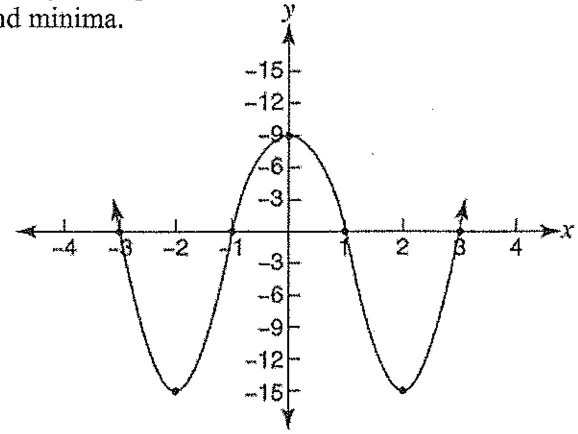
UNIT 7 PRACTICE SWIG

Name: Key Period: 3/10

Target 7.A. Analyze the graph of a polynomial function by: identify its degree, number and location of its real zeros, determine its end behavior, and determine the maxima and minima.

Use the graph below for problems 1-3.



1. For the above graph, describe the end behavior.

As $x \to +\infty$, $f(x) \to +\infty$
As $x \to -\infty$, $f(x) \to -\infty$

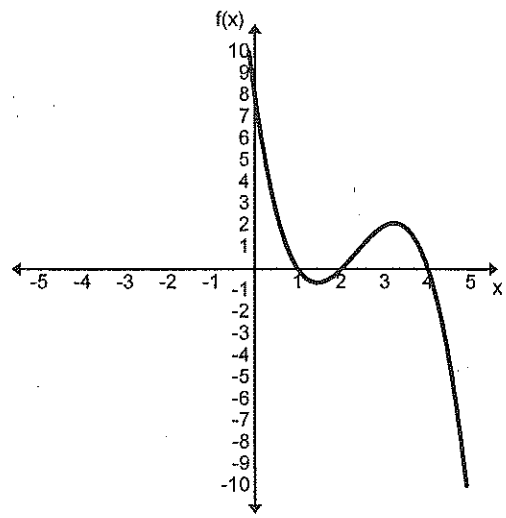
2. For the above graph, determine whether it represents an odd or even-degree polynomial function.

The only function with end behavior such the one above will be even! Notice also graph crosses x-axis max 4 times.

3. For the above graph, state the number and location of the real zeros. (How many times do you see it crossing the x-axis? Where does it cross the x-axis?

4 real zeros at -3, -1, 1, and 3

Use the graph to the right for problems 4-5.



4. Using your knowledge of real zeros and end behavior, which of the polynomial functions best describes the above graph?

A) $f(x) = x^4 + 2x^2 + .75$ No!
B) $f(x) = -x^2 - 2x + 4$ No!
C) $f(x) = x^3 + 7x^2 - 14x + 8$ No
D) $f(x) = -x^3 + 7x^2 - 14x + 8$

5. What are the estimates for the real zeros for the above graph?

Estimates are 1, 2, and 4

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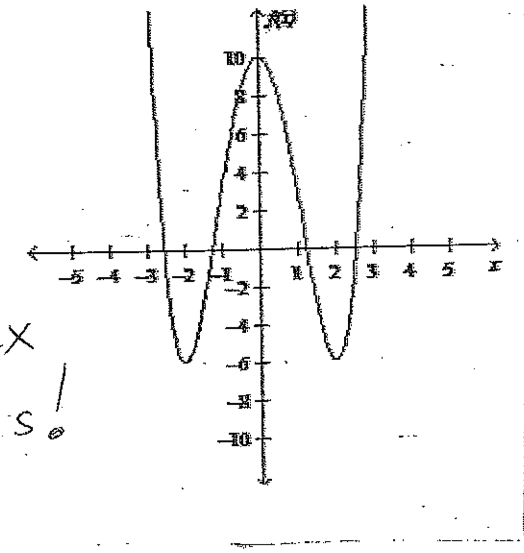
Use the graph below for problem 6.

6. What degree does the graph to the right represent?

Degree 4 since it crosses x-axis max number of 4 times!



Target 7.B. Write a polynomial function, in standard form, given its zeros.

→ partner is i

1. Write a polynomial function in factored form of least degree with real coefficients that has -8 and -*i* as zeros.

$f(x)=(x--8)(x--i)(x-i)=(x+8)(x+i)(x-i)$

2. Write a polynomial function in factored form of least degree with real coefficients that has -5, 9, and 3*i* as zeros.
→ partner $-3i$

$f(x)=(x--5)(x-9)(x-3i)(x--3i)=(x+5)(x-9)(x-3i)(x+3i)$

Target 7.C. Apply the Remainder Theorem and the Factor Theorem to determine the factors and roots of a polynomial.

Method 1: Direct! Method 2: Synthetic Substitution

3. If $h(x)=2x^2+3x-4$, find $h(-3)$.

$h(-3)=2(-3)^2+3(-3)-4$
$=2\cdot 9-9-4$
$=18-9-4=5$

$$\begin{array}{r|rrr} -3 & 2 & 3 & -4 \\ & \downarrow & -6 & 9 \\ \hline & 2 & -3 & 5 \end{array}$$

So $h(-3)=5$

4. The polynomial $x^3-x^2-10x-8$ has a factor $(x+1)$, find the remaining factors.
→ -1

$$\begin{array}{r|rrrr} -1 & 1 & -1 & -10 & -8 \\ & & -1 & 2 & 8 \\ \hline & 1 & -2 & -8 & 0 \end{array}$$

$\to x^2-2x-8$

	x	$+2$
x	x^2	$2x$
-4	$-4x$	-8

Remaining factors:
$(x+2)(x-4)$

5. Find all of the rational zeros of $f(x)=4x^3-3x^2-22x-15$.

Step 1: List all possible rational zeros

-15: $-1\cdot 15$, $-3\cdot 5$
4: $1\cdot 4$, $2\cdot 2$

$\dfrac{\pm1, \pm3, \pm5, \pm15}{\pm1, \pm2, \pm4}$

So possibilities: $\pm1, \pm3, \pm5, \pm15, \pm\frac{3}{2}, \pm\frac{1}{2}, \pm\frac{5}{2}, \pm\frac{15}{2}, \pm\frac{1}{4}, \pm\frac{3}{4}, \pm\frac{5}{4}, \pm\frac{15}{4}$

Step 2: Graph $f(x)$ on Nspire. Lets test each one.
Looks like, $-1, -\frac{5}{4}, 3$

$$\begin{array}{r|rrrr} -1 & 4 & -3 & -22 & -15 \\ & & -4 & 7 & 15 \\ \hline & 4 & -7 & -15 & 0 \end{array} \checkmark$$

$$\begin{array}{r|rrrr} 3 & 4 & -3 & -22 & -15 \\ & \downarrow & 12 & 27 & 15 \\ \hline & 4 & 9 & 5 & 0 \end{array} \checkmark$$

$$\begin{array}{r|rrrr} -\frac{5}{4} & 4 & -3 & -22 & -15 \\ & \downarrow & -5 & 10 & 15 \\ \hline & 4 & -8 & -12 & 0 \end{array} \checkmark$$

Target 7.D. Using zeros and leading coefficient from a polynomial function, construct a rough sketch of that function.

6.Graph the function:
$f(x) = (x-6)(x-1)$ to the right.
x^2

So zeros are 6, 1

The x^2 has + L.C., so graph point ↑.