1. Which describes the end behavior of $f(x) = -4x^2 + 1$?

A) as $x \to -\infty$, $f(x) \to -\infty$ and as $x \to +\infty$, $f(x) \to +\infty$

B) as $x \to -\infty$, $f(x) \to +\infty$ and as $x \to +\infty$, $f(x) \to -\infty$

C) as $x \to -\infty$, $f(x) \to +\infty$ and as $x \to +\infty$, $f(x) \to +\infty$

D) as $x \to -\infty$, $f(x) \to -\infty$ and as $x \to +\infty$, $f(x) \to -\infty$ ⟵ (circled)

2. State the number of real zeros for the function whose graph is shown at the right.
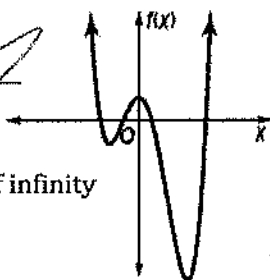
A. 0   B. 2
C. 3 (circled) D. 1
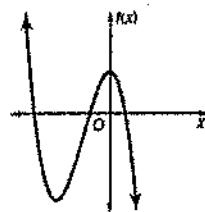
3. State the number of turning points.
   What is the degree of the function?

MAX of ___ Turning Points

Sign on LC (a)_____   Degree_____

Write the End Behavior in terms of infinity

$X \to -\infty$ $y \to \infty$
$X \to \infty$ $y \to \infty$

4. Complete the statements for the graph provided.

Number of MAX Turning Points_____

Sign on LC (a)_____   Degree_____

as $x \to \underline{-\infty}$, $y \to \underline{-\infty}$
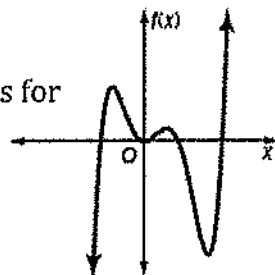
as $x \to \underline{\infty}$, $y \to \underline{\infty}$

5. FACTOR the following expressions.
   a) $x^5 - 81x$ b) $x^4 + x^3 - 4x^2 - 4x$

$(x^2+9)(x-3)(x+3)$ $x(x+1)(x-2)(x+2)$

6. GRAPH each of the following functions with the basic shape of each graph. Show all work used to find the end behavior, the y-intercept, ALL the zeros (x-intercepts), their multiplicity and behavior at the x-axis (bounce or cross).
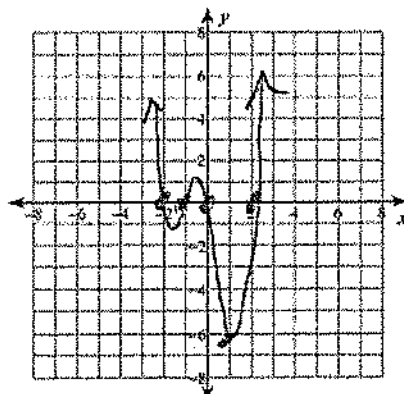
$f(x) = 2x^3 - 3x^2 = x^2(2x-3)$

X	f(x)
0	0
3/2	0
1	-1

$x \to -\infty$ $y \to -\infty$
$x \to \infty$ $y \to \infty$
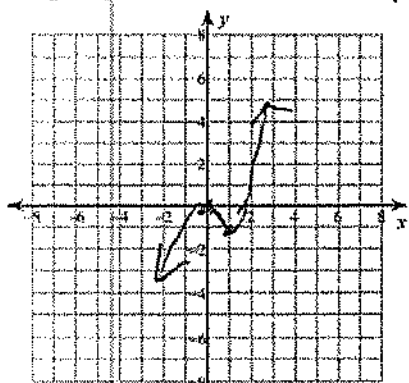
X=0 ; bounce
X = 3/2 ; cross

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

X	f(x)
-2	0
-1	0
0	0
2	0
1	

$x \to -\infty$ $y \to \infty$
$x \to \infty$ $y \to \infty$

All cross

Practice Worksheet: End Behavior & Graphing Polynomials

WITHOUT graphing, identify the end behavior of the polynomial function. (HINT: Check for Standard Form)

|		
7] $y = 2x^5 + 7x^2 + 4x$	**8]** $y = -5x$	**9]** $y = 12x^4 - 2x + 5$
MAX # of Turning Points (curves): **4**	MAX # of Turning Points (curves): **0**	MAX # of Turning Points (curves): **3**
Sign of LC (a): **+** Degree: **Odd**	Sign of LC (a): **−** Degree: **1**	Sign of LC (a): **+** Degree: **4**
as $x \to -\infty$, $y \to$ **$-\infty$**	as $x \to -\infty$, $y \to$ **∞**	as $x \to -\infty$, $y \to$ **∞**
as $x \to +\infty$, $y \to$ **$+\infty$**	as $x \to +\infty$, $y \to$ **$-\infty$**	as $x \to +\infty$, $y \to$ **∞**
10] $y = 6 - 2x - 4x^2 + 5x^3$	**11]** $y = 1 + 2x^6 - 4x^2 - 2x^6$	**12]** $y = 4x + 2 - 5x^6$
Standard Form: **$5x^3 - 4x^2 - 2x + 6$**	Standard Form: **$-4x^2 + 1$**	Standard Form: **$-5x^6 + 4x + 2$**
MAX # of Turning Points (curves): **2**	MAX # of Turning Points (curves): **1**	MAX # of Turning Points (curves): **5**
Sign of LC (a): **+** Degree: **3**	Sign of LC (a): **−** Degree: **2**	Sign of LC (a): **−** Degree: **5**
as $x \to -\infty$, $y \to$ **$-\infty$**	as $x \to -\infty$, $y \to$ **$-\infty$**	as $x \to -\infty$, $y \to$ **$-\infty$**
as $x \to +\infty$, $y \to$ **∞**	as $x \to +\infty$, $y \to$ **$-\infty$**	as $x \to +\infty$, $y \to$ **$-\infty$**

Match the polynomial function with its graph WITHOUT using a graphing calculator. Think about how the degree of the polynomial affects the shape of the graph.

A. B. C.

D. E. F.

G. H. I.
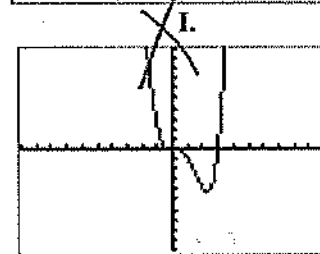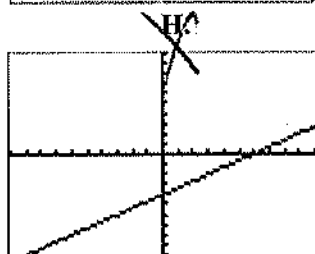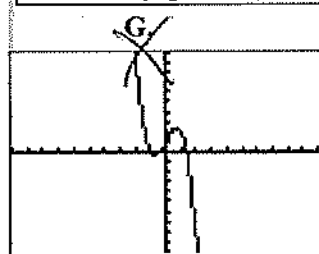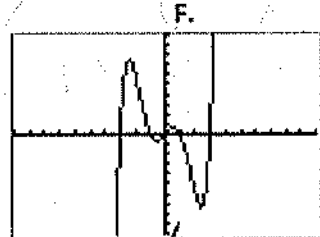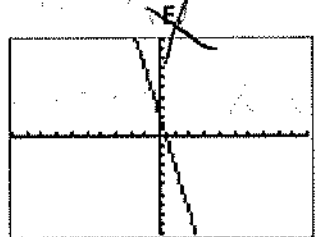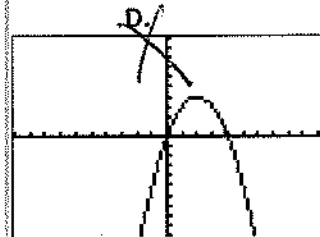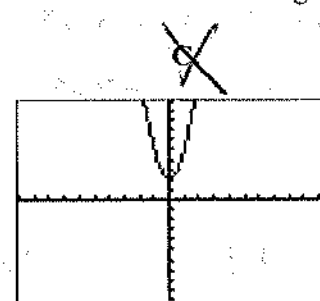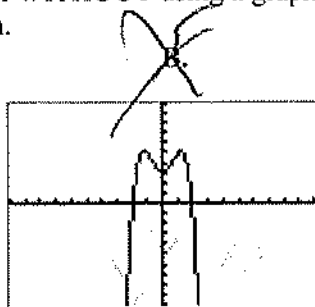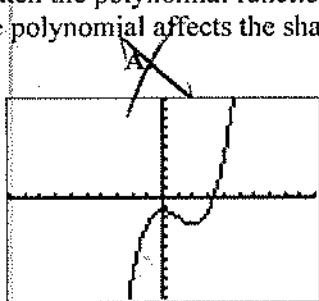
D 13] $y = -x^2 + 4x$

B 14] $y = -x^4 + 3x^2 + 3$

F 15] $y = \frac{1}{2}x^4 - \frac{3}{2}x^3$

G 16] $y = -2x^3 + 3x + 1$

C 17] $y = 3x^2 + 2$

I 18] $y = \frac{1}{5}x^5 - 2x^3 + \frac{9}{5}x$

A 19] $y = \frac{1}{3}x^3 - x^2 - \frac{4}{3}$

H 20] $y = \frac{2}{3}x - 4$

E 21] $y = -5x + 2$