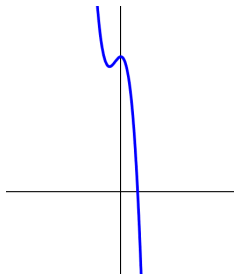
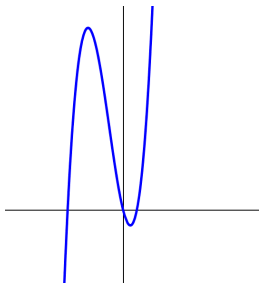
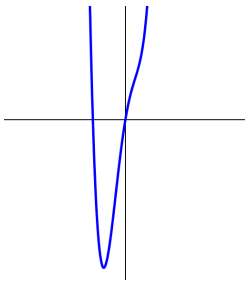
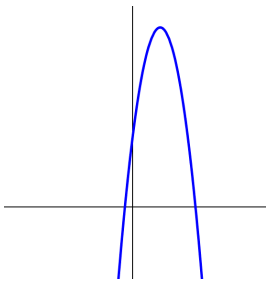
A2: Sketching Polynomial Functions

State the degree, y-intercept and end behavior. Then match each polynomial to its graph.

A	B	C	D
			

1. $f(x) = x^3 + 3x^2 - 4x$
2. $f(x) = -2x^2 + 8x + 5$
3. $f(x) = x^4 - 3x^2 + 6x$
4. $f(x) = -x^3 - 4x^2 + 8$

For each polynomial:

a) Find the real zeros. Determine whether the graph will cross or bounce at each zero.
b) Find the y-intercept.
c) State the degree and the max number of turning points.
d) State the end behavior.
e) Sketch the graph of the polynomial function. Plot extra points when necessary.

5. $f(x) = x^4 - 4x^2$
6. $f(x) = x^3 - 4x$
7. $y = -\frac{1}{5}x(x-4)^2$
8. $f(x) = x^4 - 4x^3 + 4x^2$
9. $f(x) = x^3 + 3x^2 - x - 3$
10. $g(x) = 6x^2 - 3x^3$

ANSWERS

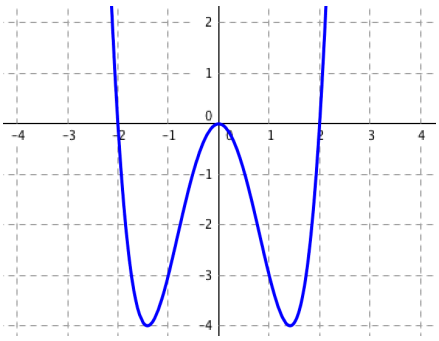
1. Degree: 3, $f(0)=0$, $\begin{matrix} x \to -\infty, f(x) \to -\infty \\ x \to \infty, f(x) \to \infty \end{matrix}$, B

2. Degree: 2, $f(0)=5$, $\begin{matrix} x \to -\infty, & f(x) \to -\infty \\ x \to \infty, & f(x) \to -\infty \end{matrix}$, D

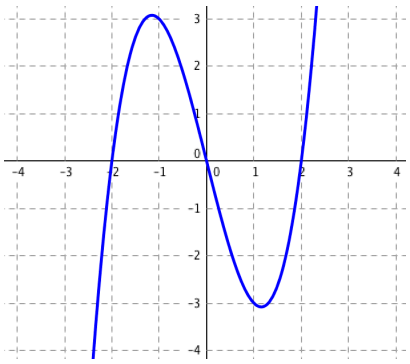
3. Degree: 4, $f(0)=0$, $\begin{matrix} x \to -\infty, f(x) \to \infty \\ x \to \infty, f(x) \to \infty \end{matrix}$, C

4. Degree: 3, $f(0)=8$, $\begin{matrix} x \to -\infty, f(x) \to \infty \\ x \to \infty, f(x) \to -\infty \end{matrix}$, A

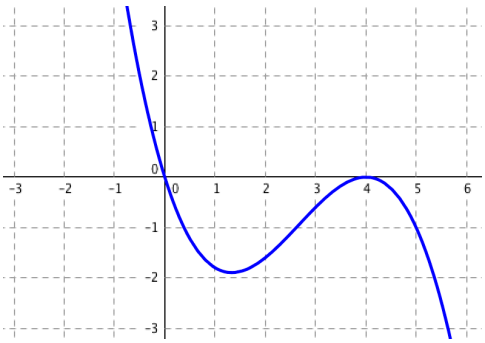
5.
a. x=-2 (cross), 0 mult 2 (bounce), 2 (cross)
b. f(0)=0
c. Degree = 4, At most 3 turns
d. $x \to -\infty, f(x) \to \infty$
$x \to \infty, f(x) \to \infty$
e.



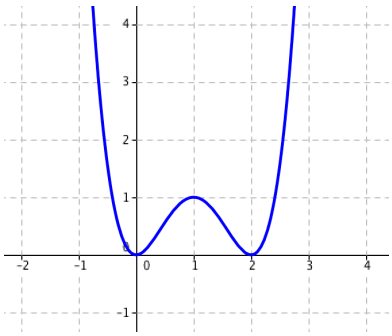
6.
a. x=-2 (cross), 0 (cross), 2 (cross)
b. f(0)=0
c. Degree: 3, At most 2 turns
d. $x \to -\infty, f(x) \to -\infty$
$x \to \infty, f(x) \to \infty$
e.

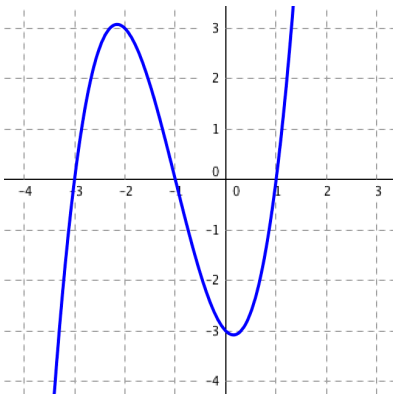


7.
a. x=0 (cross), 4 mult 2 (bounce)
b. f(0)=0
c. Degree: 3, At most 2 turns
d. $x \to -\infty, f(x) \to \infty$
$x \to \infty, f(x) \to -\infty$
e.



8.
a. x=0 mult 2 (bounce), 2 mult 2 (bounce)
b. f(0)=0
c. Degree: 4, At most 3 turning points
d. $x \to -\infty, f(x) \to \infty$
$x \to \infty, f(x) \to \infty$
e.



9. a. x=-3 (cross), -1 (cross), 1 (cross) b. f(0)=-3 c. Degree: 3, At most 2 turning points d. $x \to -\infty, f(x) \to -\infty$ $x \to \infty, f(x) \to \infty$ e. 	10. a. x=0 mult 2 (bounce), 2 (cross) b. f(0)=0 c. Degree: 3, At most 2 turning points d. $x \to -\infty, f(x) \to \infty$ $x \to \infty, f(x) \to -\infty$ e.