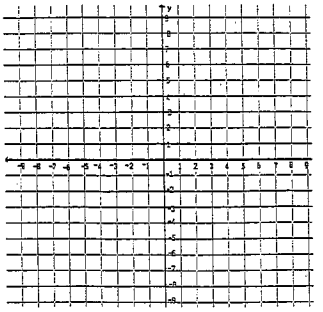
Graphing Polynomials Practice

Name: Key

Example: $P(x) = x^3 - x^2 - 4x + 4$



a) Find the zeros by factoring.

$P(x) = (x^3 - x^2) + (-4x + 4)$

$P(x) = x^2(x-1) - 4(x-1)$

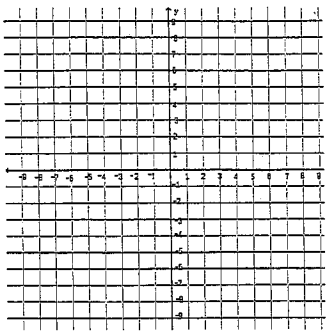
$P(x) = (x^2 - 4)(x-1)$

$P(x) = (x+2)(x-2)(x-1)$

Factor by grouping because the polynomial has 4 terms.

Set P(x) = 0 and solve.

The zeros of P(x) are -2, 2, and 1.



b) Determine end behavior.

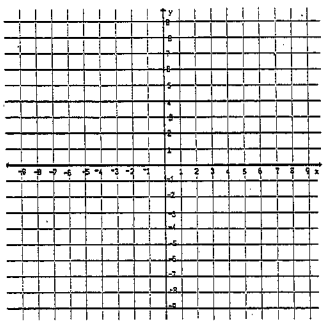
As $x \to +\infty$, $P(x) \to +\infty$.

As $x \to -\infty$, $P(x) \to -\infty$.

Because the leading coefficient is positive and the degree is odd, the graph should go up on the right and down on the left.

c) Find the y intercept by plugging in zero for x.

(0,4)



d) Plug in x values between the zeros to find local maxima.

Plug in -1 and 1.5 for x. Plot the resulting ordered pairs. (-1, 6) and (1.5, 0.875).

e) Connect all the points in a smooth curve and you are done!

Graph each of the following below by following the steps above.

1. $P(x) = x^3 - 2x^2 - 3x$

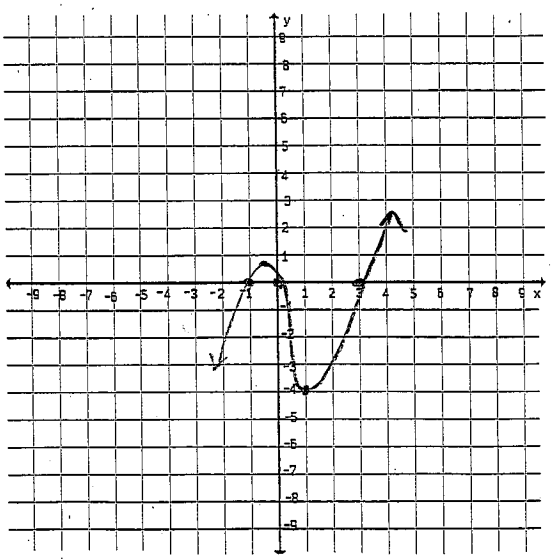
a) $x(x^2 - 2x - 3)$

$x(x-3)(x+1)$

$x=0 \quad x=3 \quad x=-1$

b) D: 3 odd

L.C: 1 pos



c) $(0, \underline{0})$ $\quad (0)^3 - 2(0)^2 - 3(0)$

d) $(-0.5)^3 - 2(-0.5)^2 - 3(-0.5)$

0.875

$(-0.5, 0.875)$

$(1)^3 - 2(1)^2 - 3(1)$

$1 - 2 - 3$

-4

$(1, -4)$

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

a) $-x^2(2x^2 + x - 3)$

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

$2x^2 + x - 3$

$x^2 + x - 6$

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

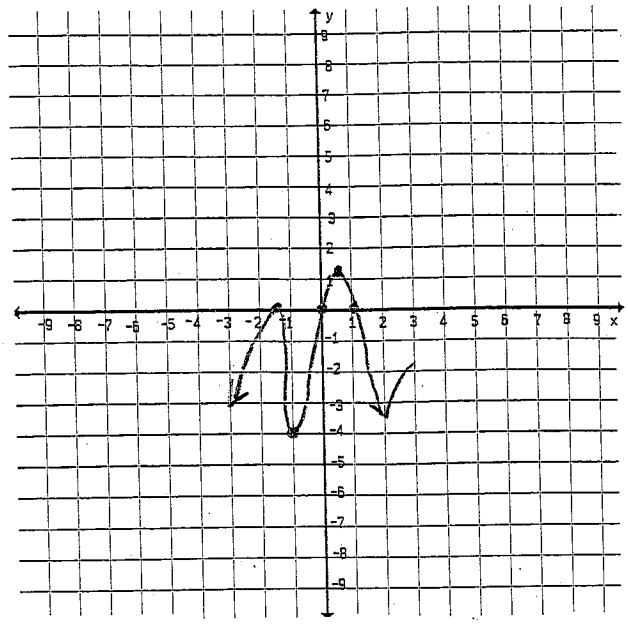
$(x + \frac{3}{2})(x - 1)$

$x = 0$	$x = -3/2$	$x = 1$
mult of 2	odd	odd
Even	cross	cross
t&t		

b) D: 4 even

L.C.: -2 neg

c) $(0, \underline{0})$



d) $-2(-1)^4 - (-1)^3 + 3(-1)^2$

$-2(1) + 1 + 3$

2

$(-1, 2)$

$-2(0.5)^4 - (0.5)^3 + 3(0.5)$

$(0.5, 1.25)$

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

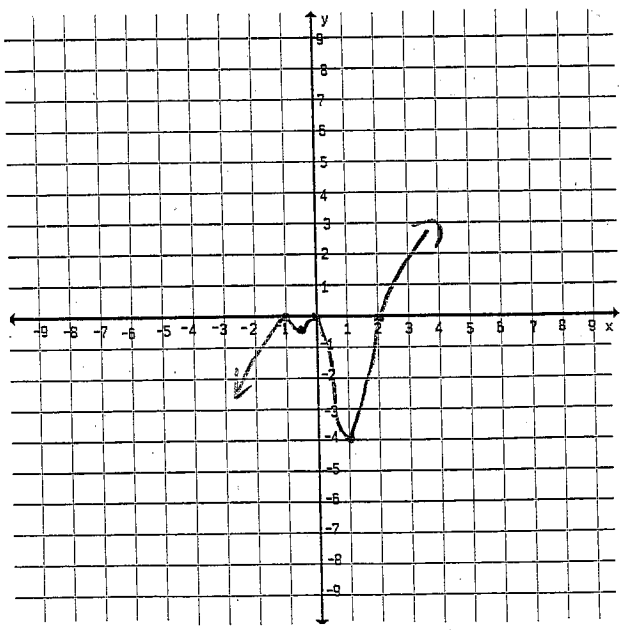
a)

$x = 0$	$x = 2$	$x = -1$
Even mult	odd mult	even mult.
t&t	cross	t&t

b) D: 9 odd

L.C.: 1 pos

c) $(0, 0)$



d) $(-0.5, \underline{-0.24})$

$(-0.5)^4(-0.5-2)^3(-0.5+1)^2$

$1^4(1-2)^3(1+1)^2$

$1(-1)^3(2)^2$

$-1(4)$

-4

$(1, -4)$

4. $P(x)=(x^3-2x^2)(-4x+8)$

a) $x^2(x-2)-4(x-2)$

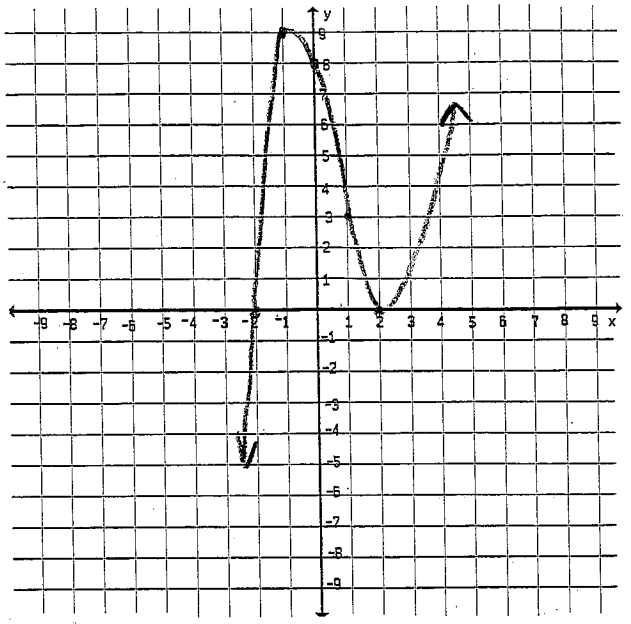
$(x-2)(x^2-4) = \underbrace{(x-2)(x-2)}_{x=2 \text{ tt}}(x+2)$

$x=-2$ cross

b)

D: 3 odd

L.C.: 1 pos



c) $(0,8)$

d) $(-1)^3-2(-1)^2-4(-1)+8$

$(1)^3-2(1)^2-4(1)+8$

$1-2-4+8$

$-1-4+8$

$-5+8$

3

$(-1,9)$

$(1,3)$

5. $P(x)=x^4-3x^2-4$

a) $(x^2-4)(x^2+1)$

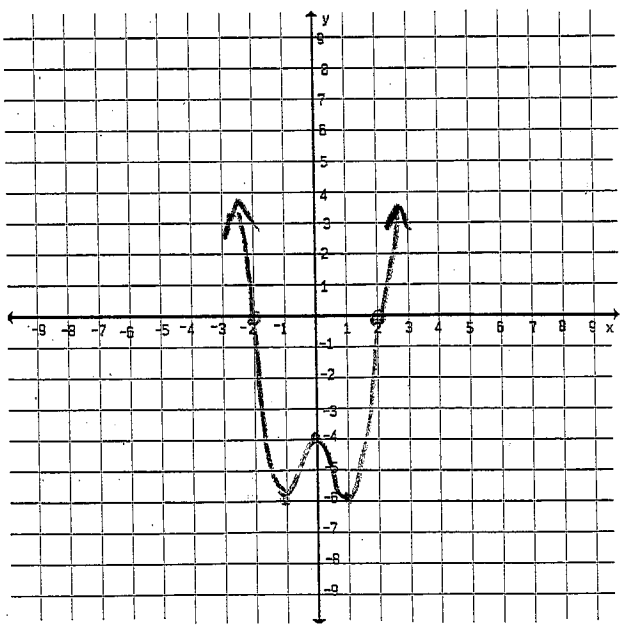
$(x+2)(x-2)$

$x=-2$ cross $\quad x=2$ cross

✓ $x^4+x^2-4x^2-4$

b) D: 4 even

L.C.: 1 pos



c) $(0,-4)$

d) $(-1)^4-3(-1)^2-4$

$(1)^4-3(1)^2-4$

$(-1,-6)$

$(1,-6)$