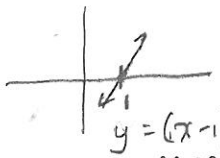
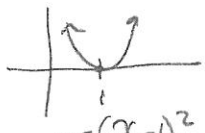
CALC 2 – REVIEW/PREVIEW UNIT 8

QUICKLY SKETCHING GRAPHS OF POLYNOMIALS (PRECALC REVIEW)

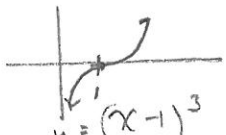
- FIND ZEROES (x-intercepts) BY FACTORING
- DETERMINE MULTIPLICITY OF ZEROS



$y = (x-1)$ crosses

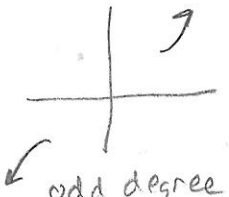


$y = (x-1)^2$ BOUNCES



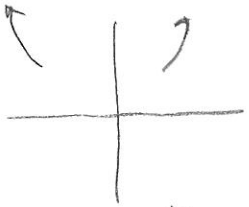
$y = (x-1)^3$ CROSSES WITH A HORIZONTAL TANGENT (LIKE A CHAIR)

- END BEHAVIOR

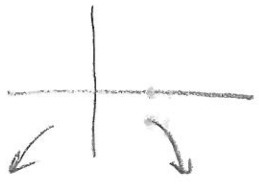


odd degree positive leading coefficient

odd degree negative leading coefficient



even degree positive leading coefficient



even degree negative leading coefficient

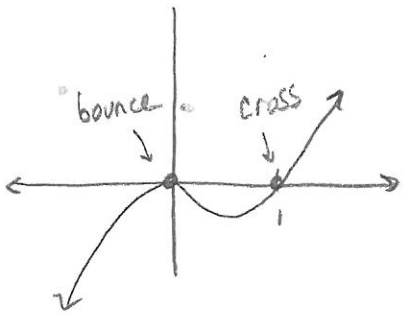
EXAMPLE 1: $f(x) = x^3 - x^2$

FACTOR: $f(x) = x^2(x-1)$

zeroes at $x = 0$ (double root, multiplicity 2, bounces)

$x = 1$ (single root, multiplicity 1, crosses)

end behavior  (degree 3, leading coefficient = +1)

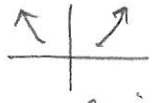


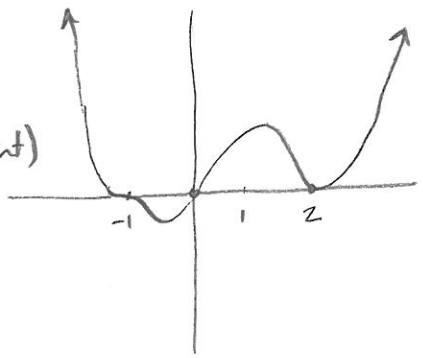
EXAMPLE 2: $f(x) = x(x+1)^3(x-2)^2$

zeroes: $x = -1$ (cross like a chair with a horizontal tangent)

$x = 0$ (cross)

$x = 2$ (bounce)

end behavior  (degree 6, positive leading coefficient)



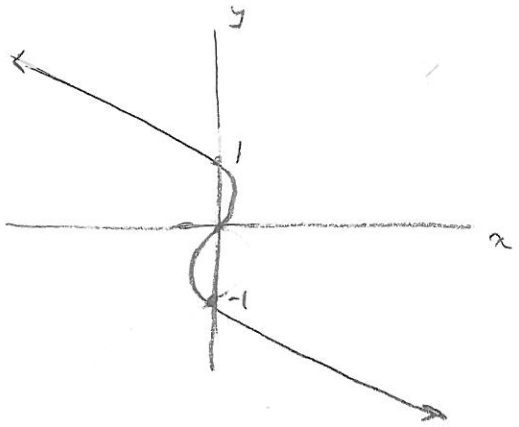
EXAMPLE 3: USE THE SAME CONCEPTS IF x IS GIVEN AS A FUNCTION OF y:

$$x = y - y^3$$

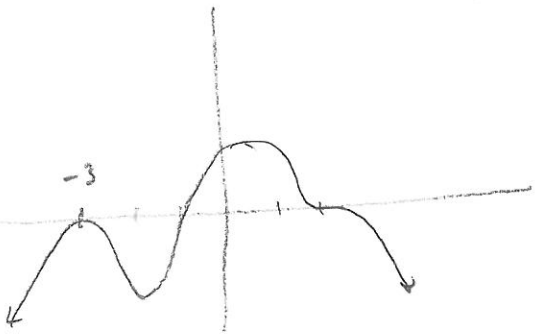
FACTOR: $x = y(1-y^2)$

$= y(1-y)(1+y)$

y-intercepts: $y = 0, 1, -1$,
no double roots
leading coefficient $= -1$



EXAMPLE 4: FIND A POSSIBLE FORMULA GIVEN A GRAPH:

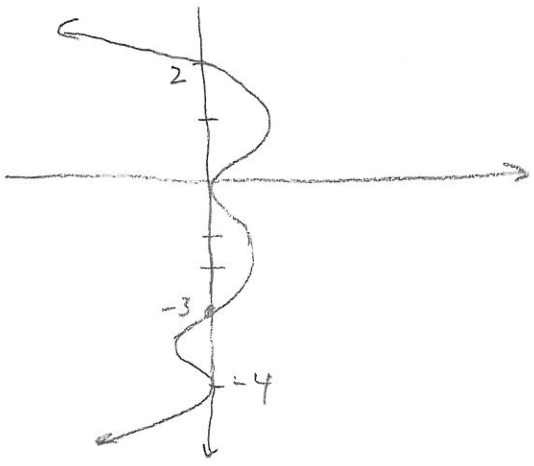


- even power
- negative leading coefficient
- x-intercepts at $x = -3$ (double)
  $x = -1$ (single)
  $x = 2$ (triple)

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

EXERCISES: (GIVE JUST ROUGH SKETCHES)

1. Find a possible formula for this graph



2. GRAPH $y = x^2 - x^4$

3. GRAPH $y = x^4 - x$

4. GRAPH $y = x^5 + 2x^4 - x^3 - 2x^2$