Consider the functions *r(x) and s(x)*, where
$r(x) = (x-3)^2$ *and* $s(x) = (x+3)^2$

$(x-3)(x-3)$

What is the degree of *r(x)*? *s(x)*?

Degree r(x)
Degree = 2

Degree s(x)
Degree = 2

What are the zeros of *r(x)*? *s(x)*?

Zeros r(x)
$x = 3$

Zeros s(x)
$x = -3$

Consider the function $t(x) = (x-3)(x+4)^2$

$(x-3)(x+4)(x+4)$

a. Expand the expression that defines *t(x)*. Identify the degree of the resulting polynomial.

$(x-3)(x^2+8x+16)$

Degree = 3

x^3+8x^2+16x
$-3x^2-24x-48$

$t(x) = x^3+5x^2-8x-48$

b. What are the zeros *t(x)*?

$x = 3$

$x = -4$

Multiplicity is how many times X-value is a zero

If multiplicity is odd:
Crosses X-axis

If multiplicity is even:
touches X-axis

State the degree and list the zeros of the polynomial function. State the multiplicity of each zero and whether the graph crosses the x-axis at the corresponding x-intercept. Graph the function on your calculator to verify your answer.

$X(X+2)(X+2)$

a) $f(x) = x(x + 2)^2$

Degree = 3

Zeros	Mult.	
$x = -2$	2	touch
$x = 0$	1	Cross

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

Degree = 5

Zeros	Mult
$x = -3$	3
$x = 1$	2

c) $f(x) = x^3(x - 4)$

Degree 4

Zeros	Mult	
$x = 4$	1	Crosses
$x = 0$	3	crosses

d) $f(x) = 3x(x - 2)^3(x - 1)^2$

Find the polynomial function with leading coefficient 1 that has the given degree and zeros.

A) Degree 3,with 2, -1, and 4 as zeros

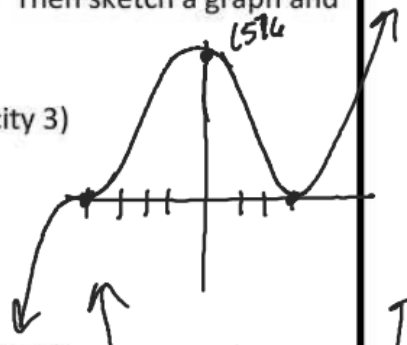
B) Degree 3 with 5, 1/3, and 2/3 as zeros

Write a polynomial function of minimum degree in factored form with real coefficients whose zeros and their multiplicities include those listed. Then sketch a graph and discuss what you notice.

a) 3 (multiplicity 2), - 4 (multiplicity 3)

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

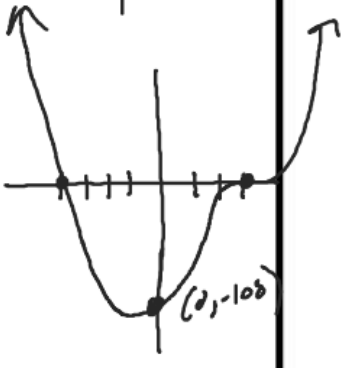
$(0,576)$



b) 3 (multiplicity 3), - 4 (multiplicity 1)

$(x-3)^3(x+4)$

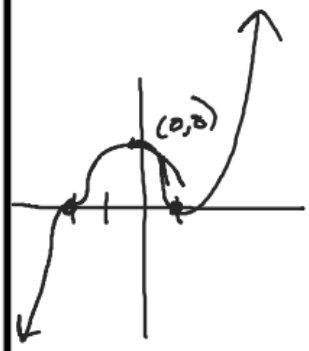
$(0,-108)$



1 (multiplicity 2), -2 (multiplicity 3)

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

$(0,8)$



$(x+1)(x+1)(x+1)$

$(x+1)(x^2+2x+1)$

x^3+2x^2+x

$+x^2+2x+1$

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

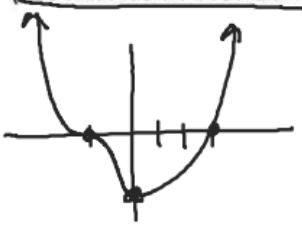
$x^4+3x^3+3x^2+x$

$-3x^3-9x^2-9x-3$

---

x^4-6x^2-8x-3

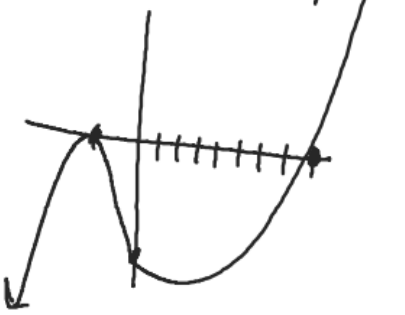
-1 (multiplicity 3), 3 (multiplicity 1) (Also write in Standard Form) $(x+1)^3(x-3)$



Write a cubic Function in factord Form with x-intercepts $(-1,0)$ and $(8,0)$

Sketch a graph

$y=(x+1)^2(x-8)$



$y=(x+1)(x-8)^2$