

Polynomials: Zeros HW

Name:

Name the zeros, their multiplicity and the effect of the multiplicity on the graph.

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

3. $f(x) = x^4 - 16x^3 + 64x^2$

$x=0$ mult: 2
 $x=1$ mult: 4
 $x=-5$ mult: 1

$x=0$ mult: 4
 $x=4$ mult: 1
 $x=8$ mult: 2

graph: bounce through
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4. Write a polynomial function in standard form that has zeros at -1, 2 and 7.

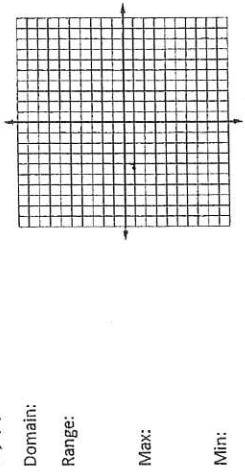
5. Write a polynomial function in standard form that has zeros at $\frac{5}{2}$ (multiplicity 2), 3 (multiplicity 1), and 0 (multiplicity 4).

$f(x) = (x+1)(x-2)(x-7)$
 $= (x^2 - x - 2)(x-7)$
 $= x^3 - 7x^2 - x^2 + 7x - 2x + 14$
 $f(x) = x^3 - 8x^2 + 5x + 14$

$f(x) = (x-5)^2(x-3)^2(x-3)$
 $= x^4(4x^2 - 20x + 25)(x-3)^2(x-3)$
 $= x^4(4x^3 - 12x^2 - 20x^2 + 25x - 75)$
 $= x^4(4x^3 - 32x^2 + 85x - 75)$
 $= 4x^7 - 32x^6 + 85x^5 - 75x^4$

Graph each of the following and identify key features.

6. $f(x) = -x^4 - 7x^3 - 12x^2$



Domain: $(-\infty, \infty)$
Range: $(-\infty, 3.124]$
Max: $(-3.569, 3.124)$
Min: $(0, 0)$

End Behavior: as $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$; as $x \rightarrow \infty$, $f(x) \rightarrow -\infty$

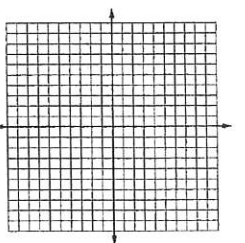
Increase: $(-\infty, -3.569)$

Decrease: $(-1.681, 0)$

y-intercept: $(0, 0)$

zeros: $(-1.681, 0)$, $(-3.569, -1.681)$, $(0, 0)$

7. $f(x) = 2x^3 + 6x^2 - 8x - 12$



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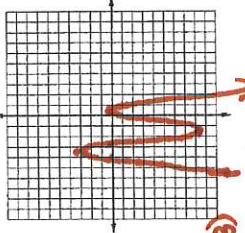
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 $= x^4(4x^2 - 20x + 25)(x-3)^2(x-3)^4$
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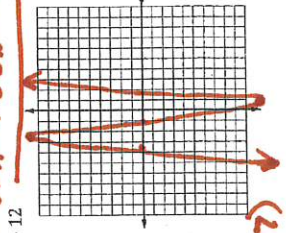
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Increase: $(-\infty, -3.569)$

Decrease: $(-1.681, 0)$

y-intercept: $(0, 0)$

zeros: $(-1.681, 0)$, $(-3.569, -1.681)$, $(0, 0)$



Domain: $(-\infty, \infty)$
Range: $(-\infty, \infty)$
Max: $(-2.528, 14.297)$
Min: $(0.528, -14.297)$

End Behavior: as $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$; as $x \rightarrow \infty$, $f(x) \rightarrow \infty$

Increase: $(-\infty, -2.528)$, $(0.528, \infty)$

Decrease: $(-2.528, 0.528)$

y-intercept: $(0, -12)$

zeros: $(-3, -3)$, $(-2, -2)$, $(2, 2)$

$-x^2(x^2 + 7x + 12)$
 $= -x^2(x+4)(x+3)$

$x=0$ mult. 2 bounce

$x=-4$ mult. 1 goes through

$x=-3$ mult. 1 goes through

graph

$(-1, 0)$, $(1.646, 0)$

$(-3.646, 0)$

$2(x^3 + 3x^2 - 4x - 6)$
 $= 2(x^2(x+3) - 2(2x+3))$