

Bellwork: Sketch a graph of the function below:

$f(x) = -2x^2(x-6)(x+7)^2(x-2)$

zero	mult.	T/C
6	3 0	C
-7	2 e	T
2	1 0	C
→ 0	2 e	T

$-2(x+0)^2$
 $-2(x)^2$

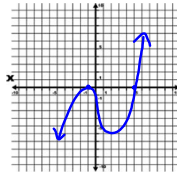
E.B. degree: 8 even
 ↓ ↓ -

$$x^3 + 3x^2 - 7x + 4$$

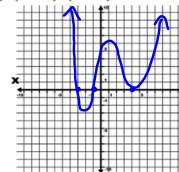
$$(x-7)^3 (x$$

Homework 2.5 Solutions

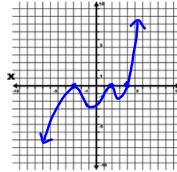
1. $f(x) = (x+1)^4(x-5)^2$



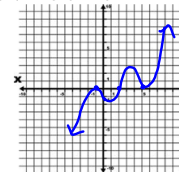
3. $f(x) = (x-4)^2(x+1)^2(x+3)$



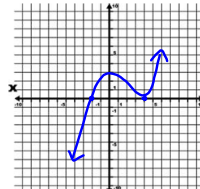
2. $f(x) = (x-2)^2(x+3)^2(x-4)$



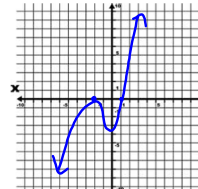
4. $f(x) = (x-2)^3(x+1)^2(x-5)^2$



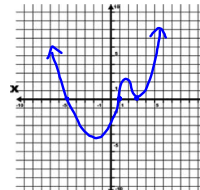
5. $f(x) = (x-4)^2(x+2)$



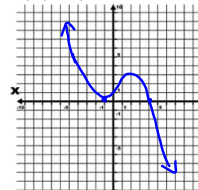
7. $f(x) = (x+2)^4(x-1)^5$



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

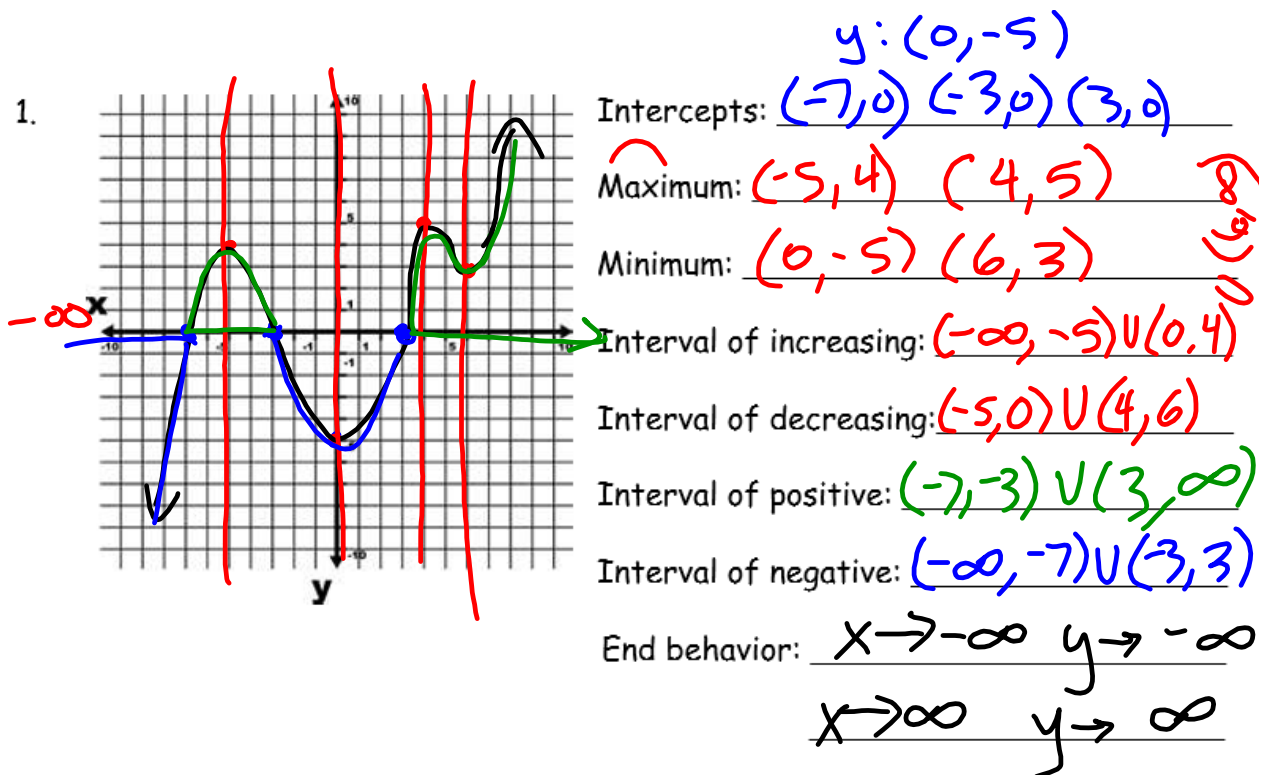


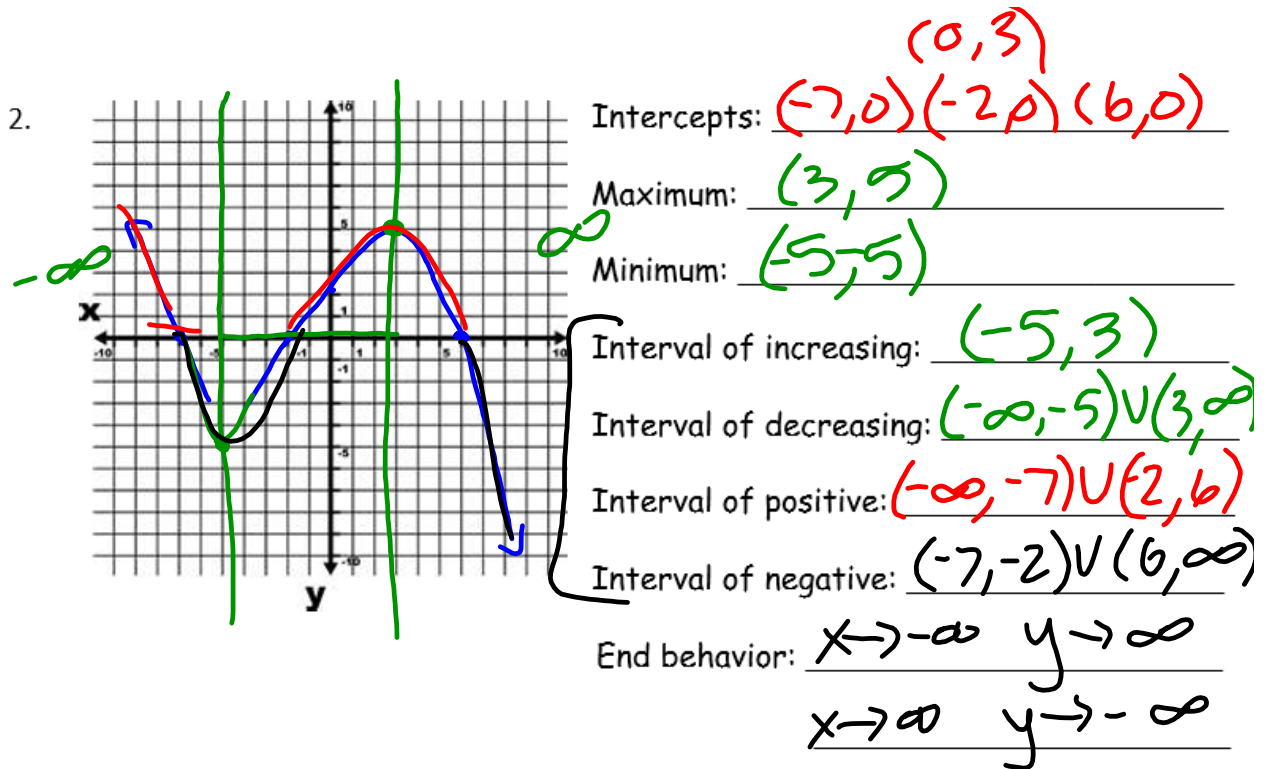
8. $f(x) = -(x-4)^3(x+1)^2$



Unit 2 Review

★ Make a 3" x 5" Notecard





outside = vertical inside = horizontal

3. Given the function $f(x) = x^2$, describe the transformations required for $g(x) = 2f(3x) - 4$.

1. up-down Flip (reflect across x-axis)
2. vertical stretch by 2
3. horizontal stretch by $\frac{1}{3}$
4. vertical shift down 4

4. Given the function $f(x) = x^2$, describe the transformations required for $h(x) = \frac{1}{2}f(-x) + 3$.

1. vert. stretch by $\frac{1}{2}$
2. reflect over y -axis (left-right flip)
3. shift up 3

5. Given the function $f(x) = x^2$, describe the transformations required for $j(x) = f(x-4) + 1$.

- shift right 4
shift up 1

6. Determine the average rate of change on the function $f(x) = (x-1)^3 + 2$ over the interval $[-1, 3]$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - (-6)}{3 - (-1)} = \frac{16}{4} = 4$$

$$f(3) = (3-1)^3 + 2 = 10$$

$$f(-1) = (-1-1)^3 + 2 = -6$$

7. Determine the average rate of change on the function $f(x) = 3\sqrt{x-2} + 1$ over the interval $[6, 11]$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 7}{11 - 6} = \frac{3}{5}$$

$$f(11) = 3\sqrt{11-2} + 1 = 10$$

$$f(6) = 3\sqrt{6-2} + 1 = 7$$

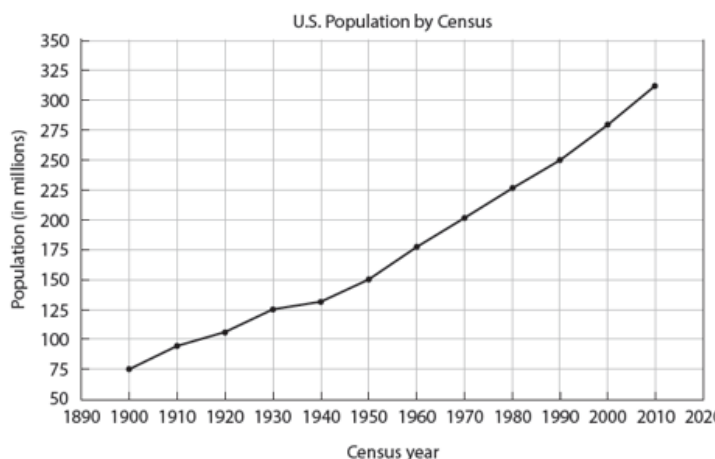
8. The average price for a ticket to a movie theater in North America for selected years is shown in the table below. What is the average change in ticket price from 1991 to 2003?

Year	Price (\$)
1987	3.91
1991	4.21
1995	4.35
1999	5.06
2003	6.03
2007	6.88
2009	7.50

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{6.03 - 4.21}{2003 - 1991}$$

$$= \frac{1.82}{12} = .15$$

9. The graph below shows the United States population from 1900 to 2010, as recorded by the U.S. Census Bureau.



$$y_2 - y_1 / x_2 - x_1$$

2.05

What was the rate of change in the population from 1900 to 2000?

$$\frac{280 - 75}{2000 - 1900} = \frac{205}{100}$$

Is this greater or less than the rate of change in the population from 2000 to 2010?

$$\frac{315 - 280}{2010 - 2000} = \frac{35}{10} = 3.5$$

The avg. population change from 1900-2000 is less than 2000-2010.

- zeros
x-intercepts
10. How many complex roots will the following functions have?

a. $f(x) = -3x^6 + 8x^3 - 2x + 15$

6 roots

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

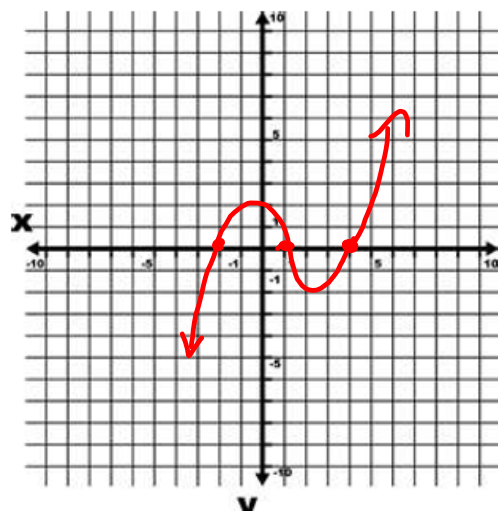
3 zeros

Sketch a graph of the following polynomials

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

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

$x = 4, 1, -2$
 degree: 3 odd + $\downarrow \uparrow$
 all cross through

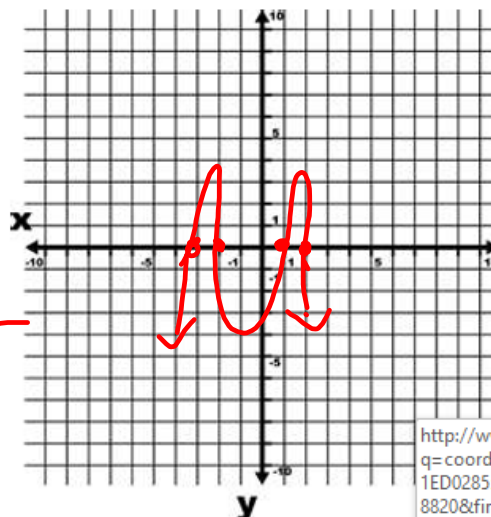


12. $f(x) = -x^4 - 4x^3 + x^2 + 16x + 12$

$f(x) = -\cancel{(x^2 - 4)}(x + 3)(x - 1)$
 $(x + 2)(x - 2)$

$x = -3, 1, 2, -2$

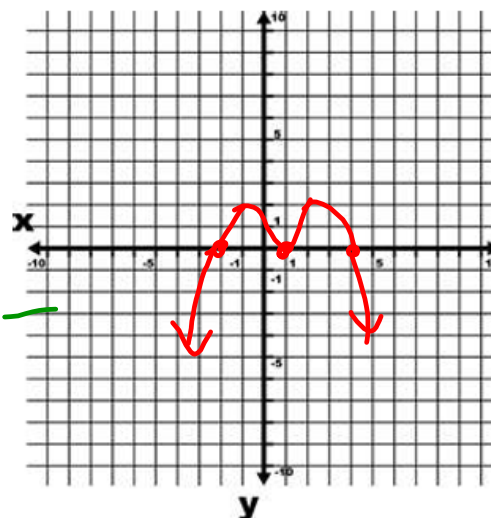
E.B. degree: 4 even —
 ↓ ↓



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

zero	mult	T/C
4	3	C
-2	5	C
1	2	T

E.B. degree: 10 even —
 ↓ ↓



14. State the end behavior of the polynomial:

a. $f(x) = -3x^6 + 4x^5 - 7x^4 - 2x^3 + x^2 + 5x + 10$

6 = even -
 $\downarrow \searrow$

$$\begin{array}{ll} x \rightarrow -\infty & y \rightarrow -\infty \\ x \rightarrow \infty & y \rightarrow -\infty \end{array}$$

b. $f(x) = 4x^3 - 2x^2 + 5$

degree: 3 = odd +
 $\swarrow \nearrow$

$$\begin{array}{ll} x \rightarrow -\infty & y \rightarrow -\infty \\ x \rightarrow \infty & y \rightarrow \infty \end{array}$$

15. What are the zeros for the polynomial:

a. $f(x) = (x - 4)(x + 3)(2x - 5)$

$x = 4, -3, 5/2$

$$2x - 5 = 0$$

$$\frac{2x}{2} = \frac{5}{2}$$

b. $f(x) = 4x(x^2 - 9)(x + 8)$

$4(x)(x-3)(x+3)(x+8)$

$x = 0, 3, -3, -8$

$x = 5/2$

16. State each zero and its multiplicity and tell whether the function crosses or touches the x-axis

a. $f(x) = (x - 4)^6(x + 5)^4(x - 2)^2$

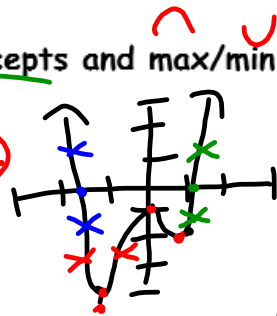
zero	mult	T/C
4	6	T
-5	4	T
2	2	T

b. $f(x) = (x - 4)^9(x + 3)^{12}(x + 6)^3(x + 2)$

zero	mult		T/C
4	9	odd	C
-3	12	even	T
-6	3	odd	C
-2	1	odd	C

17. Using a calculator determine the intercepts and max/min of the following functions.

a. $f(x) = 3x^4 + 2x^3 - 5x^2 - 1$
 max: (0, -1)
 min: (-1.2, -5.4) (0.7, -2)
 y-int: (0, -1)
 x-int: (-1.7, 0) (1.1, 0)



b. $f(x) = x^5 - 2x^4 + x^3 - 2x^2 + x + 1$
 x-int: 2nd TRACE 2: zero
 y-int:
 max:
 min:

