Work on back

1) (-1, 4) Vertex
(0, 3) Yintercept

2) (-4, -2) Vertex
(0, 14) y-inter

X = -1 Axis of Symm.
(-∞, ∞) (-∞, 4]

X = -4 Axis of Symm
(-∞, ∞) [-2, ∞)

Do 1 or 2
3 or 4

TICKET ★ 1 ★

TICKET ★ 2 ★

TICKET ★ 3 ★

TICKET ★ 4 ★

Work on back

a) Vertex $\left(\frac{-1}{2(-.025)}, P:C\right)$
(20, 16)
$-.025(20)^2 + 20 + 6$
$= 16$

b) Ask y-intercept
(0, 6) 6 ft high

c) Set y = 0 Solve for x
$0 = -.025x^2 + x + 6$
Use Calc

3.1

In Exercises 1–4, use the vertex and intercepts to sketch the graph of each quadratic function. Give the equation for the parabola's axis of symmetry. Use the graph to determine the function's domain and range. -1 +4 16 -2

1. $f(x) = -(x + 1)^2 + 4$
2. $f(x) = (x + 4)^2 - 2$
3. $f(x) = -x^2 + 2x + 3$
4. $f(x) = 2x^2 - 4x - 6$

opens down

3) (1, 4) Vertex
(0, 3) y-int X = 1 A of S
$\frac{-2}{2(-1)}$ $-1+2+3$

4) (1, -8) vertex
(0, -6)
$\frac{4}{2(2)}$ X = 1 A of S
$2-4-6$

7. A quarterback tosses a football to a receiver 40 yards downfield. The height of the football, $f(x)$, in feet, can be modeled by

$$f(x) = -0.025x^2 + x + 6,$$

where x is the ball's horizontal distance, in yards, from the quarterback.

a. What is the ball's maximum height and how far from the quarterback does this occur? → y coordinate → It is 20 yds down field

b. From what height did the quarterback toss the football?

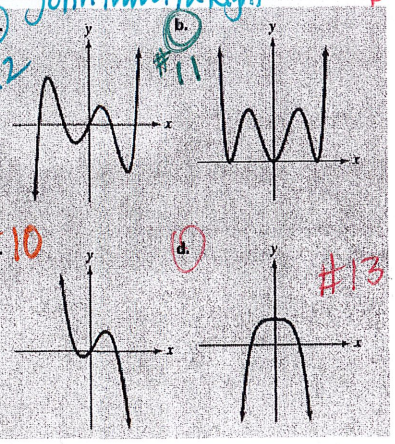
c. If the football is not blocked by a defensive player nor caught by the receiver, how far down the field will it go before hitting the ground? Round to the nearest tenth of a yard. 45.3 yds down field It will hit ground

In Exercises 10–13, use the Leading Coefficient Test to determine the end behavior of the graph of the given polynomial function. Then use this end behavior to match the polynomial function with its graph. [The graphs are labeled (a) through (d).]

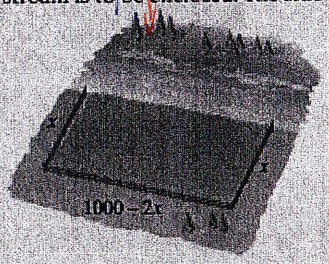
10. $f(x) = -x^3 + x^2 + 2x$
11. $f(x) = x^6 - 6x^4 + 9x^2$
12. $f(x) = x^5 - 5x^3 + 4x$
13. $f(x) = -x^4 + 1$

C John Travolta Left hand
B field goal up
A John Travolta Right
D field goal down

a. #12 b. #11 c. #10 d. #13



8. A field bordering a straight stream is to be enclosed. The side bordering the stream is not to be fenced. If 1000 yards of fencing material is to be used, what are the dimensions of the largest rectangular field that can be fenced? What is the maximum area?



1000 total yds

$P = 2l + 2w$ $l = 1000 - 2x$ $A = l \cdot w$
$W = x$

Maximize Area So you will need to find the vertex

$x(1000 - 2x) = \text{Area}$ $\left(\frac{-b}{2a}, P:C\right)$

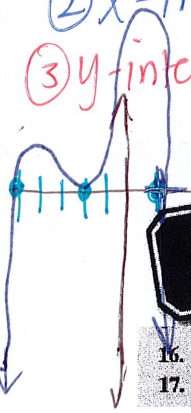
$-2x^2 + 1000x = A(x)$ (250, 125000)

$\frac{-1000}{2(-2)}$ If width is 250 yds the length would be $1000 - 2(250) =$ length 500

Width 250 yds length 500 yds total area of 125,000 yd^2

Total Area $-2(250)^2 + 1000(250)$

16) ① Degree = 6 field Goal L.C = -2 open down
② x-intercepts x=1 fly, x=-2 Low tap Mult 2, x=-5 fly Mult 3
③ y-intercept (0, 1000) $-2(0-1)(0+2)^2(0+5)^3$ $-2(-1)(4)(125)$



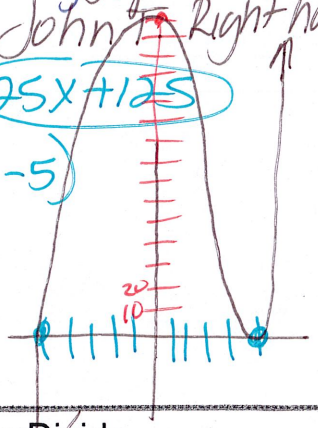
TICKET ★ 5

In Exercises 16–17, find the zeros for each polynomial function and give the multiplicity of each zero. State whether the graph crosses the x-axis, or touches the x-axis and turns around, at each zero.

Sketch Graph

16. $f(x) = -2(x-1)(x+2)^2(x+5)^3$
17. $f(x) = x^3 - 5x^2 - 25x + 125$

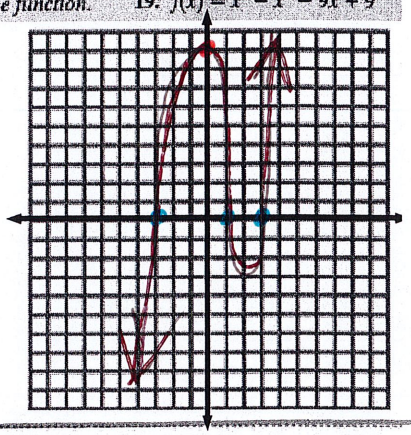
17) Degree = 3 John Right hand
x-intercepts $x^3 - 5x^2 - 25x + 125$
$x^2(x-5) - 25(x-5)$
$(x^2-25)(x-5)$
$(x+5)(x-5)(x-5)$
$x=-5$ $x=5$ Mult 2 Love tap
y-inter (0, 125)



1) Degree 3 John Right
x-intercepts $x^3 - x^2 - 9x + 9$
$x^2(x-1) - 9(x-1)$
$(x+3)(x-3)(x-1)$
(-3, 0) (3, 0) (1, 0)
(0, 9)

#6

In Exercises 19–24,
a. Use the Leading Coefficient Test to determine the graph's end behavior.
b. Determine whether the graph has y-axis symmetry, origin symmetry, or neither.
c. Graph the function.
19. $f(x) = x^3 - x^2 - 9x + 9$



Synthetic Divide

TICKET ★ 7 ★

27. $(4x^3 - 3x^2 - 2x + 1) \div (x + 1)$

$$\begin{array}{r|rrrr} -1 & 4 & -3 & -2 & 1 \\ & \downarrow & -4 & 7 & -5 \\ \hline & 4 & -7 & 5 & -4 \end{array}$$

$4x^2 - 7x + 5$ R -4 OR $4x^2 - 7x + 5 + \frac{-4}{x+1}$

TICKET ★ 8 ★

In Exercises 27–29, divide using long division.

28. $(10x^3 - 26x^2 + 17x - 13) \div (5x - 3)$

$2x^2 - 4x + 1$ R -10 OR $2x^2 - 4x + 1 + \frac{-10}{5x-3}$

$$\begin{array}{r} 2x^2 - 4x + 1 \text{ R } -10 \\ 5x-3 \overline{)\,10x^3 - 26x^2 + 17x - 13} \\ -(10x^3 - 6x^2) \\ \hline -20x^2 + 17x \\ -(-20x^2 + 12x) \\ \hline 5x - 13 \\ -(5x - 3) \\ \hline -10 \end{array}$$

↑ Placeholder

TICKET ★ 9 ★

33. Use synthetic division to divide $f(x) = 2x^3 + x^2 - 13x + 6$ by $x - 2$. Use the result to find all zeros of f.

$$\begin{array}{r|rrrr} 2 & 2 & 1 & -13 & 6 \\ & \downarrow & 4 & 10 & -6 \\ \hline & 2 & 5 & -3 & 0 \end{array}$$

Remainder is zero
$x-2$ is indeed a factor

$2x^3 + x^2 - 13x + 6 = (x-2)(2x^2 + 5x - 3)$ So now do...
$(x-2)(2x^2 + 6x - 1x - 3)$
$(x-2)(2x(x+3) - 1(x+3))$
$(x-2)(2x-1)(x+3) = 0$
$x = 2$ $x = \frac{1}{2}$ $x = -3$

TICKET ★ 10 ★

$(x-4)$ is a factor

34. Solve the equation $x^3 - 17x + 4 = 0$ given that 4 is a Root

$$\begin{array}{r|rrrr} 4 & 1 & 0 & -17 & 4 \\ & \downarrow & 4 & 16 & -4 \\ \hline & 1 & 4 & -1 & 0 \end{array}$$

So you can factor
$x^3 - 17x + 4 \Rightarrow (x-4)(x^2 + 4x - 1)$ complet square
$x^2 + 4x + 4 = 1 + 4$
$(x+2)^2 = 5$

$x = -2 \pm \sqrt{5}$
$x = 4$
3 Roots