Round 3 decimal places

Section 2.5 Modeling with Polynomial Functions Name_____Hr____

CW 1) Sally's distance D from a motion detector is given by the data in the following table.

t (sec) L1	D (m) L2	t (sec) L1	D (m) L2
0.0	3.36	4.5	3.59
0.5	2.61	5.0	4.15
1.0	1.86	5.5	3.99
1.5	1.27	6.0	3.37
2.0	0.91	6.5	2.58
2.5	1.14	7.0	1.93
3.0	1.69	7.5	1.25
3.5	2.37	8.0	0.67
4.0	3.01		

a) Find a cubic regression model, and graph it together with a scatter plot of the data

plot on, zoom stat

stat, calc, 6

$y = -0.082x^3 + 0.916x^2 - 2.513x + 3.378$

b) Describe Sally's motion.

from 0-2 sec, Sally walks toward the detector, from 2-5 sec Sally walks away, then from 5-8 sec Sally walks towards Det. again.

c) Use the cubic regression model to estimate when Sally changes direction. How far is she from the motion detector when she changes direction?

At 1.813 sec, 1.344 m from detector - begins walking away

At 5.634 sec, 3.631 m from detector - begins walking toward

HW 2) Jacob's distance D from a motion detector is given by the data in the following table.

t (sec)	D (m)	t (sec)	D (m)
0.0	4.59	4.5	1.70
0.5	3.92	5.0	2.25
1.0	3.14	5.5	2.84
1.5	2.41	6.0	3.39
2.0	1.73	6.5	4.02
2.5	1.21	7.0	4.54
3.0	0.90	7.5	5.04
3.5	0.99	8.0	5.59
4.0	1.31		

a) Find a quadratic regression model, and graph it together with a scatter plot of the data

b) Describe Jacob's motion.

c) Use the quadratic regression model to estimate when Jacob changes direction. How far is he from the motion detector when he changes direction?

The Fundamental Theorem of Algebra: A polynomial function of degree *n* has *n* complex zeros (real and nonreal). Some of these zeros may be repeated.

*If *k* is a nonreal complex zero of a polynomial function, then *k* is not an x-intercept.

Complex Conjugate Zeros Theorem: Suppose that f(x) is a polynomial function with real coefficients. If a and b are real numbers with b not equal to 0 and a + bi is a zero of f(x), then its complex conjugate a – bi is also a zero of f(x).

Exercises:

$i^2 = -1$

Write a polynomial function of minimum degree in standard form with real coefficients whose zeros include those listed.

CW 1) 1, 3i, -3i

$f(x) = (x-1)(x-3i)(x+3i)$

$(x-1)(x^2 + 3ix - 3ix - 9i^2)$

$(-9)(-1)$

$f(x) = (x-1)(x^2+9)$

$f(x) = x^3 + 9x - x^2 - 9$

$f(x) = x^3 - x^2 + 9x - 9$

CW 2) 5, 3+2i, 3-2i

$f(x) = (x-5)(x-(3+2i))(x-(3-2i))$

FOIL

$(x-5)(x^2 - x(3+2i) - x(3-2i) + (3+2i)(3-2i))$

$-3x - 2ix \quad -3x + 2ix \quad + 9 - 6i + 6i - 4i^2$

$9+4$

$(x-5)(x^2 - 6x + 13)$

$f(x) = x^3 - 11x^2 + 43x - 65$

HW 3) -4, 1 – i, 1 + i

HW 4) 2 (multiplicity 2), 3 + i (multiplicity 1), 3 - i

$f(x) = (x-2)(x-2)(x-(3+i))(x-(3-i))$

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HW Is it possible for an odd degree polynomial to have no real zeros? Explain

Is it possible for an even degree polynomial to have no real zeros? Explain