Intro to Calc Polynomial Review Name: Key

1. Rewrite each into vertex form.
   1. F(x) = x2 – x + ¾ b. f(x) = -x2 + 2x + 5

Y = (x – ½)2 + ½ y = -(x – 1)2 + 6

1. Find the vertex form of the quadratic that has the given vertex and passes through the given point.
   1. V = (4, 1) point: (6, -7) b. v = (-4, -1) point: (-2, 4)

Y = -2(x – 4)2 + 1 y = 5/4 (x + 4)2 – 1

1. Identify the vertex, axis of symmetry, x and y intercepts for each:
   1. F(x) = x2 + 10x + 14 b. f(x) = -x2 - x + 30

Vertex: (-5, -11) (-1/2, 121/4)

Axis of symmetry: x = -5 x = -1/2

x-intercepts: (-5 ± √11 , 0) (-6, 0), (5, 0)

y-intercepts: (0, 14) (0, 30)

1. a. The path of a diver is approximated by the equation h(x) =  where h(x) is the height of the diver (in ft) and x is the horizontal distance (in ft) from the end of the diving board. What is the maximum height of the diver and when does it occur?

16 feet, at 2.4 feet away from the board

1. From 1960 to 2004, the annual per capita consumption C(t) of cigarettes by Americans (age 18 and older) can be modeled by the function C(t) = 4306 – 3.4t – 1.32t2, 0 < t < 44 where t is the year, with t = 0 corresponding to 1960. When did the maximum annual consumption of cigarettes occur? What was it?

1960, 4306 cigarettes per person per year

1. Is the data in each table best represented by a linear or quadratic function. Explain your reasoning and write the regression equation, rounding to the nearest 100th.

|  |  |
| --- | --- |
| X | f(x) |
| 1 | 1 |
| 2 | 3 |
| 3 | 5 |
| 3.5 | 9 |
| 5 | 17 |
| 7 | 38 |

|  |  |
| --- | --- |
| X | F(x) |
| 1 | -8.6 |
| 2 | -9.4 |
| 3 | -10 |
| 3.5 | -10.1 |
| 5 | -12 |
| 7 | -12.4 |

* 1. b.

**Y = .98x2 – 1.74x + 2.09, r2 = .9973** **y = .03x2 – .95x – 7.59, r2 = .9568**

Y = 6.16x – 9.90, r2 = .9160 y = -.67x – 8.01, r2 = .9481

Quadratic, r2 is higher. For both a and b.

1. Describe the left-hand and right-hand behavior (the end behavior) of the graphs of each:
   1. F(x) = 5x4 – 3x2 + 7 b. f(x) = -2x7 + 3x6 +15x5

As x →∞, y → ∞ As x →∞, y → - ∞

As x → - ∞, y → ∞ As x → - ∞, y → ∞

1. Use long division to find the divisor. State if the given divisor is a factor of the polynomial.
   1. (2x4 + 6x2 + 2) (x2 – 2x + 3) b. 2x4 + 4x3 – 5x2 + 3x – 2  (x2 + 2x – 3)

2x2 + 4x + 8 + , not a factor 2x2 + 1 + , not a factor

1. If the given binomial is a root of the given polynomial function, use synthetic division to factor the polynomial function completely and list all real zeros of the function.
   1. (x + 2); f(x) = 2x3 + x2 – 5x + 2 b. (x + 3); f(x) = 3x3 + 2x2 – 19x + 6

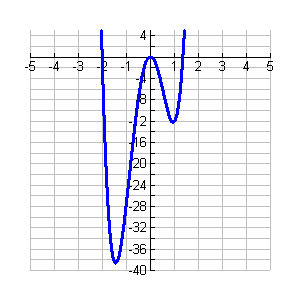
(x + 2)(2x – 1)(x – 1) (x + 3)(3x – 1)(x – 2)

-2, ½, 1 -3, 1/3, 2

1. Use Decartes’ Rule of Signs to determine the number of possible positive and negative real roots of each function:
   1. F(x) = 2x4 – x3 +6x2 – x + 5 b. f(x) = x3 + x2 – 4x – 4

Poss pos real roots: 4, 2, or 0 1

Poss neg real roots: none 2 or 0

1. Use the Rational Zero Test to determine the possible rational zeros of each function:
   1. F(x) = 2x4 – 17x3 + 35x2 + 9x – 45 b. f(x) = 4x5 – 8x4 – 5x3 + 10x2 + x – 2
   2. ± 1, 3, 5, 9, 15, 45, ½, 3/2, 5/2, 9/2, 15/2, 45/2
   3. ± 1, 2, ½, ¼
2. Find the roots (and state any multiplicity) of the given functions. Sketch question **a.** making sure to evaluate points between the x-intercepts.
   1. **F(x) = 12x4 + 8x3 – 32x2** c. f(x) = x9 + 5x7 – 24x5

0, mult of 2 0, mult of 5

4/3 ±√3

-2 ±2i√2

* 1. F(x) = 2x3 – 3x2 – 11x + 6 d. f(x) = x4 – 2x3 – 5x2 + 22x – 24

-2, ½, 3 2, -3,

1. Use f(x) =  and g(x) =  to evaluate:
   1. (f+g)(x) b. (fg)(x) c. (f/g)(x) d. (f○g)(x)

1. Find the zeros and multiplicities, y-intercepts, absolute and relative max’s and min’s, end behavior, intervals increasing/decreasing, and intervals positive/negative for f(x) = x3(3x – 4)(x + 1). Simplify it by multiplying it out.

F(x) = 3x5 – x4 – 4x3

Zeros: 0, mult of 3; 4/3, -1

y-int: 0

As x → ∞, y → ∞

As x → - ∞, y → - ∞

Int pos: (-1, 0) U (4/3, ∞)

Int neg: (-∞, -1) U (0, 4/3)

Max: .6626

Min: -2.0194

Int inc: (-∞, -.7710) U (1.0376, ∞)

Int dec: (-.7710, 1.0376)