3.2 WS 2

KEY

Examine the leading term to determine the far-left and far-right behavior of the graph of each polynomial function.

1. $P(x) = -450 + x^6$

Far-left: Up (∞)
Far-right: Up (∞)

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

Far-left: Up (∞)
Far-right: Down ($-\infty$)

3. $P(x) = -x^5 + 4x^2 + 9$

Far-left: Up (∞)
Far-right: Down ($-\infty$)

4. $P(x) = \frac{3}{4}x^4 - 5x^3 + 6x^2 - 3x - 7$

Far-left: Up (∞)
Far-right: Up (∞)

Find all relative and absolute extreme values.

5. $P(x) = x^3 - 3x^2 - 24x + 3$

Relative max of 31 at -2.
Relative min of -77 at 4.

6. $P(x) = -3x^2 + 12x - 2x^3 + 1$

Relative min of -19 at -2.
Relative max of 8 at 1.

7. $P(x) = x^4 - 10x^2 + 9$

Absolute min of -16 at -2.24 and -16 at 2.24.
Relative max of 9 at 0.

Find all the real zeros of each polynomial by factoring.

8. $P(x) = x^5 - 5x^3 + 4x$

$x(x^4 - 5x^2 + 4) = 0$
$x(x^2 - 4)(x^2 - 1) = 0$

$x = 0, \pm 2, \pm 1$

9. $P(x) = 4x^4 - 37x^2 + 9$

AC
36
$-\frac{36}{4}$ $-\frac{1}{4}$
-9

$\sqrt{x^2} = \sqrt{9}$ $\sqrt{x^2} = \sqrt{\frac{1}{4}}$

$x = \pm 3, \pm \frac{1}{2}$

Use long division to divide the polynomials.

10. $\dfrac{x^3-8x-3}{x-3}$

$$x-3 \;\overline{)\; x^3+0x^2-8x-3}$$

x^2+3x+1

$-x^2+3x^2$

$3x^2-8x-3$

$-3x^2+9x$

$x-3$

$-x+3$

0

x^2+3x+1

11. $\dfrac{-8x^2+2x+4x^3-1}{2x+1}$

$$2x+1 \;\overline{)\; 4x^3-8x^2+2x-1}$$

$2x^2-5x+\frac{7}{2}$

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

$-10x^2+2x-1$

$+10x^2+5x$

$7x-1$

$-7x+\frac{7}{2}$

$-\frac{9}{2}$

$2x^2-5x+\frac{7}{2}+\frac{-9}{4x+2}$

Use synthetic division to divide the polynomial.

12. $\dfrac{2x^3-x^2+3x-1}{x-3}$

3	2	-1	3	-1
	↓	6	15	54
	2	5	18	53

$2x^2+5x+18+\dfrac{53}{x-3}$

13. $\dfrac{8x^3-4x^2+3x}{x+5}$

-5	8	-4	3	0
	↓	-40	220	-1115
	8	-44	223	-1115

$8x^2-44x+223+\dfrac{-1115}{x+5}$

Use synthetic division to determine whether the binomial is a factor of $P(x)$.

14. $P(x)=9x^4-6x^3-23x^2-4x+4,\ x+1$

-1	9	-6	-23	-4	4
		-9	15	8	-4
	9	-15	-8	4	0

yes

15. $P(x)=16x^4+9x^2+14x-8x^3+4,\ x-\frac{1}{4}$

$\frac{1}{4}$	16	-8	9	14	4
		4	-1	2	4
	16	-4	8	16	8

No