Name Key Period

Chapter 2 Test Review
Algebra 2 with Trigonometry

Simplify the expression.

1. $(y^{-4}z^{5})^{-3}$

$y^{12}z^{-15}$

$\frac{y^{12}}{z^{15}}$

2. $(y^{-3}z^{-2})^{5}$

$y^{-15}z^{-10}$

$\frac{1}{y^{15}z^{10}}$

3. $(4a^{-3}b^{7})(2a^{12}b^{-6})$

$8a^{9}b$

4. $(-2x^{3}y^{17})(9x^{-10}y^{-5})$

$-18x^{-7}y^{12}$

$\frac{-18y^{12}}{x^{7}}$

Write the polynomial function in standard form. State its degree, type, and leading coefficient.

5. $f(x)=2x^{2}-5x-x^{3}$

Standard form: $f(x)=-x^{3}+2x^{2}-5x$ Degree: 3

Type: cubic Leading Coefficient: -1

6. $f(x)=2x^{4}-3x^{3}+2x^{2}-5x+19$

Standard form: as is Degree: 4

Type: quartic Leading Coefficient: 2

7. Use direct substitution to evaluate
$f(x) = 4x^5 + 6x^3 + x^2 - 10x + 5$
when $x = -2$.
Show your work.

$f(-2) = 4(-2)^5 + 6(-2)^3 + (-2)^2 - 10(-2) + 5$

$f(-2) = -147$

8. Use direct substitution to evaluate
$f(x) = 6x^3 - 25x + 20$
when $x = 5$.
Show your work.

$f(5) = 6(5)^3 - 25(5) + 20$

$f(5) = 645$

9. Use synthetic substitution to evaluate
$f(x) = -2x^4 + 3x^3 - 8x + 13$ when $x = 2$.
Show your work.

2	-2	3	0	-8	13
	↓	-4	-2	-4	-24
	-2	-1	-2	-12	-11

$f(2) = -11$

10. Use synthetic substitution to evaluate
$f(x) = x^4 + 3x - 20$ when $x = 4$.
Show your work.

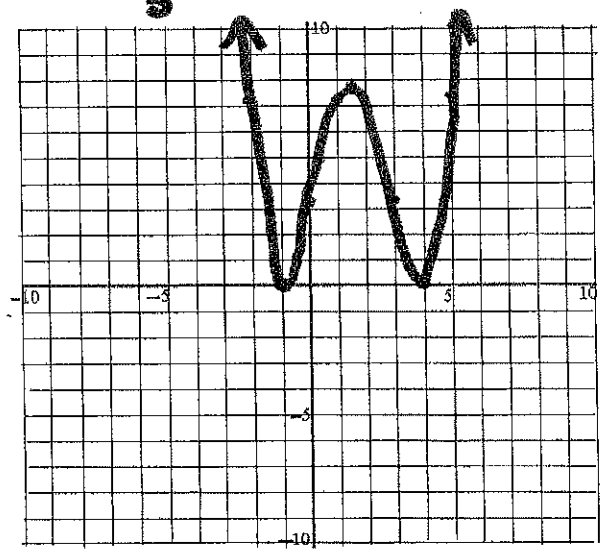
4	1	0	0	3	-20
	↓	4	16	64	268
	1	4	16	67	248

No

$f(4) = 248$

Graph the given function. Describe the end behavior of the graph.
Calculate zeros, local minimums, local maximums, and a table of values.

11. $f(x) = \frac{1}{5}(x-4)^2(x+1)^2$



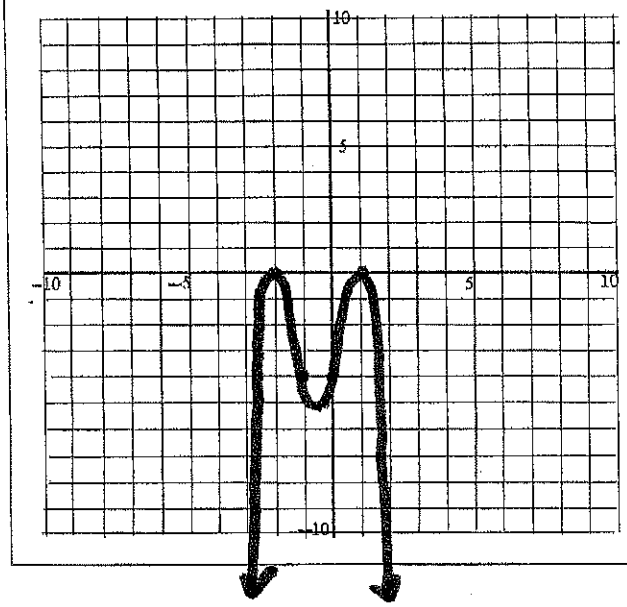
$f(x) \to +\infty$ as $x \to -\infty$

$f(x) \to +\infty$ as $x \to \infty$

min/zero: (-1, 0) and (4, 0)

max: (1.5, 7.8)

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



$f(x) \to -\infty$ as $x \to -\infty$

$f(x) \to -\infty$ as $x \to \infty$

max/zero: (-2, 0) and (1, 0)

min: (-.5, -5.1)

Perform the indicated operation.

13. $(3x+4)^2$

$(3x+4)(3x+4)$

$9x^2+12x+12x+16$

$9x^2+24x+16$

14. $(2x-3)^3 = (2x-3)(2x-3)(2x-3)$

$(4x^2-12x+9)(2x-3)$

	$4x^2$	$-12x$	$+9$
$2x$	$8x^3$	$-24x^2$	$18x$
-3	$-12x^2$	$36x$	-27

$8x^3-36x^2+54x-27$

Perform the indicated operation.

15. $(7x+3)-(2x^2-x+5)$

$7x+3-2x^2+x-5$

$-2x^2+8x-2$

16. $(4x^2+3x-7)-(6x^2-7x+10)$

$4x^2+3x-7-6x^2+7x-10$

$-2x^2+10x-17$

Factor the polynomial completely.

17. $8x^3-1$

$(2x)^3-(1)^3$

$(2x-1)(4x^2+2x+1)$

18. $1000x^3-27$

$(10x)^3-(3)^3$

$(10x-3)(100x^2+30x+9)$

19. $4x^3+8x^2-9x-18$

$4x^2(x+2)-9(x+2)$

$(4x^2-9)(x+2)$

$(2x+3)(2x-3)(x+2)$

20. $y^3-7y^2+4y-28$

$y^2(y-7)+4(y-7)$

$(y^2+4)(y-7)$

Write a polynomial function f of least degree that has rational coefficients, a leading coefficient of 1, and the following zeros:

21. $3, -1, -2i$ $+2i$

$f(x)=(x-3)(x+1)(x+2i)(x-2i)$

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

	x^2	$-2x$	-3
x^2	x^4	$-2x^3$	$-3x^2$
$+4$	$4x^2$	$-8x$	-12

$f(x)=x^4-2x^3+x^2-8x-12$

22. $1, -2, -5i$ $+5i$

$f(x)=(x-1)(x+2)(x+5i)(x-5i)$

$f(x)=(x^2+x-2)(x^2+25)$

	x^2	x	-2
x^2	x^4	x^3	$-2x^2$
$+25$	$25x^2$	$25x$	-50

$f(x)=x^4+x^3+23x^2+25x-50$

Divide. (using either polynomial long division or synthetic division)

23. $x^3+5x^2-7x+2 \div x-2$

$2 \mid 1 \;\; 5 \;\; -7 \;\; 2$
$\quad\;\; 2 \;\; 14 \;\; 14$
$1 \;\; 7 \;\; 7 \;\; 16$

$x^2+7x+7+\frac{16}{x-2}$

24. $x^3-5x^2-2 \div x-4$

$4 \mid 1 \;\; -5 \;\; 0 \;\; -2$
$\quad\;\; 4 \;\; -4 \;\; -16$
$1 \;\; -1 \;\; -4 \;\; -18$

$x^2-x-4-\frac{18}{x-4}$

Factor the polynomial f(x) completely considering the given factor.

25. $f(x)=x^3+2x^2-51x+108;\ x+9$

$-9 \mid 1 \;\; 2 \;\; -51 \;\; 108$
$\quad\;\; -9 \;\; 63 \;\; -108$
$1x^2-7x+12 \;\; 0$

$(x+9)(x-4)(x-3)$

26. $f(x)=x^3+x^2-16x-16;\ x-4$

$4 \mid 1 \;\; 1 \;\; -16 \;\; -16$
$\quad\;\; 4 \;\; 20 \;\; 16$
$1x^2+5x+4 \;\; 0$

$(x-4)(x+4)(x+1)$

Word Problem Review

27. A shipping box is shaped like a rectangular prism. It has a total volume of 96 cubic inches. The height is two inches less than the width and the length is eight inches longer than the width. What are the dimensions of the box?

$V = l \cdot w \cdot h$
$96 = (x+8)(x)(x-2)$
$96 = (x^3+6x^2-16x)$
$x^3+6x^2-16x-96=0$
$x^2(x+6)-16(x+6)=0$
$(x^2-16)(x+6)=0$
$(x+4)(x-4)(x+6)=0$

$-4 \quad 4 \quad -6$

12 in x 4 in x 2 in

28. **PETROLEUM** Since 1980, the number W (in thousands) of United States wells producing crude oil and the average daily oil output per well O (in barrels) can be modeled by

$$W = -0.575t^2 + 10.9t + 548 \quad \text{and} \quad O = -0.249t + 15.4$$

where t is the number of years since 1980. Write a model for the average *total* amount T of crude oil produced per day. What was the average total amount of crude oil produced per day in 2000?

	$-.575t^2+10.9t$	$+548$
$-.249t$	$.143175t^3$	$-2.7141t^2$	$-136.452t$
15.4	$-8.855t^2$	$167.86t$	8439.2

$T(20) \approx 5585$ barrels

$T = .143175t^3 - 11.5691t^2 + 31.408t + 8439.2$