

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

Simplify the following radicals.

1)  $-3\sqrt{-500} < \frac{100}{5}$  (10/10)

$-30i\sqrt{5}$

2)  $4\sqrt{-50}$   
25 2

$20i\sqrt{2}$

3)  $\sqrt{\frac{40}{36}} < \frac{10}{3}$  (2/2)

$\frac{2\sqrt{10}}{6} = \frac{\sqrt{10}}{3}$

Simplify the following expressions.

4)  $(2 + 10i)(1 - 4i)$

$2 - 8i + 10i + 40$

$42 + 2i$

5)  $(3 - 12i) - 5(2 - i)$

$3 - 12i - 10 + 5i$

$-7 - 7i$

6)  $\frac{2+3i}{6-10i} \cdot \frac{6+10i}{6+10i} = \frac{12+20i+18i+30i^2}{36+60i-60i-100i^2}$

$= \frac{-18+38i}{136}$

$= \frac{-9+19i}{68}$

7)  $\frac{-4i}{5+2i} \cdot \frac{5-2i}{5-2i} = \frac{-20i+8i^2}{25-10i+10i-4i^2}$

$= \frac{-8-20i}{29}$

Simplify using powers of i.

8)  $i^{40} - 3i^{51} - 8i^{62}$

$1 - 3(-i) - 8(-1)$

$1 + 3i + 8 = 9 + 3i$

9)  $3i^{34} + 4i^{41}$

$3(-1) + 4i$

$-3 + 4i$

Find the degree of the following monomials:

10)  $10x^3y^5z$

9

11)  $6x^2$

2

12)  $-15$

0

Write in standard form, find the degree, and leading coefficient:

13)  $x^3 - 3x + 4x^5 + 2$

$4x^5 + x^3 - 3x + 2$

D: 5

LC: 4

14)  $3x - 6x^2$

$-6x^2 + 3x$

D: 2

LC: -6

15)  $-1 + x$

$x - 1$

D: 1

LC: 1

16)  $(2x - 2x^2 + 4) + (3x^2 - 5x + 5x^6 + 2)$

$5x^6 + x^2 - 3x + 6$

17)  $(3x - x^4 - 3x^3 + 1) - (6x^2 - 3x + 2x^4 + 5)$

$3x - x^4 - 3x^3 + 1 - 6x^2 + 3x - 2x^4 - 5$

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

18)  $2(4x+3y)(4x+3y)$

$(8x+6y)(4x+3y)$

$32x^2 + 24xy + 24xy + 18y^2$

$32x^2 + 48xy + 18y^2$

19)  $(2x^2 - 5x + 1)(x^2 - x + 6)$

$2x^2 - 5x + 1$

$x^2$	$2x^4$	$-5x^3$	$x^2$
$-x$	$-2x^3$	$5x^2$	$-x$
$6$	$12x^2$	$-30x$	$6$

$2x^4 - 7x^3 + 18x^2 - 31x + 6$

20)  $(m+n)^3$

$1 m^3 n^0 = m^3$   
 $3 m^2 n^1 = 3m^2n$   
 $3 m^1 n^2 = 3mn^2$   
 $1 m^0 n^3 = n^3$

$m^3 + 3m^2n + 3mn^2 + n^3$

Divide the following polynomials by the method of your choice.

22)  $(3x^3 + 9x^2 - 14) \div (x+2)$

$$\begin{array}{r} -2 \overline{) 3 \ 9 \ 0 \ -14} \\ \underline{-6 \ -6 \ \phantom{0} \ 12} \\ 3 \ 3 \ -6 \ -2 \end{array}$$

$3x^2 + 3x - 6 + \frac{-2}{x+2}$

23)  $(6x^3 - 10x^2 + 3x - 3) \div (x-5)$

$$\begin{array}{r} 5 \overline{) 6 \ -10 \ 3 \ -3} \\ \underline{5 \ -25 \ \phantom{0} \ 15} \\ 6 \ -10 \ 103 \ 15 \end{array}$$

$6x^2 + 20x + 103 + \frac{15}{x-5}$

Factor the following polynomials:

24)  $-7x^2 + 51x - 14$

$-(7x^2 - 51x + 14)$

$(7x^2 - 49x - 2x + 14)$   
 $7x(x-7) - 2(x-7)$

$-(7x-2)(x-7)$

25)  $25x^4 - 100y^8$

$25(x^4 - 4y^8)$

$25(x^2 + 2y^4)(x^2 - 2y^4)$

26)  $x^2 + 7x + 10$

$(x+2)(x+5)$

For questions 1-4, write the EQUATION of a polynomial using the given roots.

1) Roots = -1 (mult of 2), -3  
 $(x+1)(x+1)(x+3) = 0$   
 $(x+1)(x^2 + 4x + 3) = 0$

x	$x^3$	$4x^2$	$3x$
1	$x^2$	$4x$	$3$

$$x^3 + 5x^2 + 7x + 3 = 0$$

2) Roots = 2, 0 (mult of 2)

$$x^2(x-2) = 0$$

$$x^3 - 2x^2 = 0$$

3) Roots =  $\frac{4}{7}$ , 4

$$(7x-4)(x-4) = 0$$

$$7x^2 - 28x - 4x + 16 = 0$$

$$7x^2 - 32x + 16 = 0$$

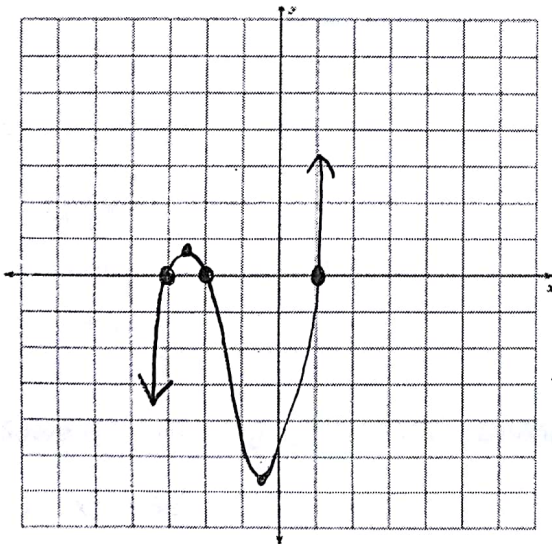
4) Roots =  $2 \pm 3$

$$(x-2)(x+3)(x-3) = 0$$

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

$$x^3 - 2x^2 - 9x + 18 = 0$$

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



roots = -3, -2, 1

Local Minimum  $(-0.5, -5.625)$  Local Maximum  $(-2.5, 0.875)$

Y-Intercept  $(0, -6)$

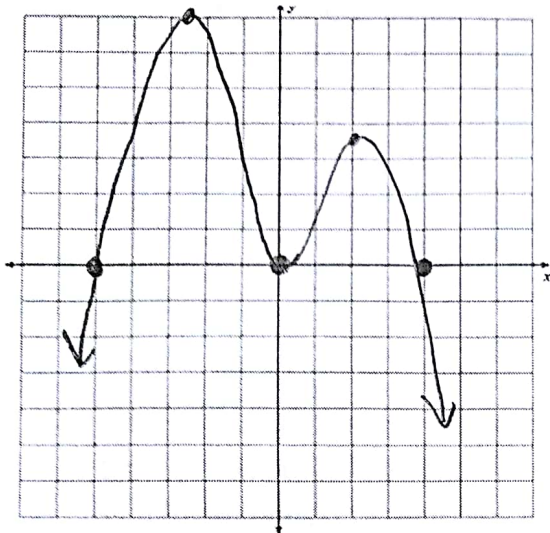
End Behavior AS  $x \rightarrow -\infty, f(x) \rightarrow -\infty$   
 AS  $x \rightarrow \infty, f(x) \rightarrow \infty$

$$(-2.5, 0.875)$$

$$(-0.5, -5.625)$$



6) Graph  $f(x) = -x^4 - x^3 + 20x^2$  roots = 0 mult. of 2, -5, 4



Local Minimum  $(0,0)$  Local Maximum  $(-2.5, 101.5625)$

Y-Intercept  $(0,0)$   $(2.56)$

End Behavior  $\text{As } x \rightarrow -\infty, f(x) \rightarrow -\infty$   
 $\text{As } x \rightarrow \infty, f(x) \rightarrow -\infty$

$(-2.5, 101.5625)$

$(2.56)$

Solve the following by FACTORING.

7)  $4x^5 - 16x^3 - 180x = 0$

$4x(x^4 - 4x^2 - 45) = 0$

$4x(x^2 - 9)(x^2 + 5) = 0$

$4x(x+3)(x-3)(x^2+5) = 0$

$x^2 + 5 = 0$   
 $\sqrt{x^2 + 5} = 0$   
 $x = \pm i\sqrt{5}$

$x = 0, -3, 3, \pm i\sqrt{5}$

8)  $x^2 - 10x = -9$

$x^2 - 10x + 9 = 0$

$(x-9)(x-1) = 0$

$x = 9, 1$

9)  $49x^2 = 25$

$49x^2 - 25 = 0$

$(7x+5)(7x-5) = 0$

$x = \pm 5/7$

10)  $(x^3 + 3x^2)(-5x - 15) = 0$

$x^2(x+3) - 5(x+3) = 0$

$x^2 - 5 = 0 \leftarrow (x^2 - 5)(x+3) = 0$   
 $\sqrt{x^2 - 5} = 0$   
 $x = \pm\sqrt{5}$

$x = \pm\sqrt{5}, -3$

Solve the following by SYNTHETIC DIVISION AND FACTORING.

11)  $x^3 - 5x^2 + 7x - 3 = 0$

$$\begin{array}{r|rrrr} 1 & 1 & -5 & 7 & -3 \\ & \downarrow & & & \\ & 1 & -4 & 3 & 0 \end{array}$$

$x^2 - 4x + 3 = 0$

$(x-3)(x-1) = 0$

$x = 3, 1 \text{ mult. of } 2$

12)  $x^5 - 2x^4 + 8x^3 - 16x^2 + 7x - 14 = 0$

$$\begin{array}{r|rrrrrr} 2 & 1 & -2 & 8 & -16 & 7 & -14 \\ & \downarrow & 2 & 0 & 16 & 7 & 0 \\ \hline & 1 & 0 & 8 & 0 & 7 & 0 \end{array}$$

$x^4 + 8x^2 + 7 = 0$

$(x^2 + 7)(x^2 + 1) = 0$

$x = \pm i\sqrt{7}, \pm i, 2$

- 15) The cost of packing boxes,  $c$ , varies inversely with the number of boxes,  $b$ , purchased. If  $c = \$0.85$  when  $b = 50$ , determine the cost of packing 8 boxes.

$$C = \frac{k}{b}$$

$$.85 = \frac{k}{50}$$

$$k = 42.5$$

$$C = \frac{42.5}{8}$$

$$= \boxed{\$5.31}$$

- 16) The owner of a bookstore developed a model for determining the price of rare comic books. The price,  $P$ , of each book should vary directly with the number of people,  $N$ , that have requested the book and inversely to the number of such books in existence,  $M$ . If  $N = 20$  people,  $M = 20,000$  copies, and  $P = \$10$ , then find  $P$  for  $N = 200$  people and  $M = 100$  copies.

$$P = \frac{kN}{M}$$

$$10 = \frac{k(20)}{20000}$$

$$\frac{200000}{20} = \frac{20(k)}{20}$$

$$k = 10,000$$

$$P = \frac{10000N}{m}$$

$$= \frac{10000(200)}{100}$$

$$= \boxed{\$20,000}$$

- 17) The cost,  $C$ , of hiring a contractor to build a patio varies jointly as the area,  $A$ , in square feet, of the patio and the price,  $P$ , per square foot of the patio tiles. If  $C = \$3,584$  when  $A = 90$  square feet and  $P = \$3.05$ , find  $P$  when  $C = \$5368$  and the area equals 115 square feet.

$$C = kAP$$

$$3584 = k(90)(3.05)$$

$$13.06 = k$$

$$5368 = 13.06(115)P$$

$$P = \boxed{\$3.57}$$

FBM #3 Review 3

Simplify each and state the excluded values.

1)  $\frac{a^2 + 3a - 18}{9a^2 + 54a} = \frac{(a+6)(a-3)}{9a(a+6)} = \frac{a-3}{9a}$   
 Excluded values:  $a \neq 0, -6$

2)  $\frac{n^2 - 16}{n^2 + 2n - 24} = \frac{(n+4)(n-4)}{(n+6)(n-4)} = \frac{n+4}{n+6}$   
 Excluded values:  $n \neq -6, 4$

3)  $\frac{5n^2 - 58n + 80}{5n^3 - 59n^2 + 90n} = \frac{(5n-8)(n-10)}{n(5n-9)(n-10)} = \frac{5n-8}{n(5n-9)}$   
 Excluded values:  $n \neq 0, 9/5, 10$

4)  $\frac{2x(5x^2 + 8x - 4)}{10x^3 + 16x^2 - 8x} = \frac{2x(5x-2)(x+2)}{2(x+3)(x+2)} = \frac{x(5x-2)}{x+3}$   
 Excluded values:  $x \neq -3, -2$

Multiply or Divide each Expression

5)  $\frac{1}{b+9} \div \frac{b+8}{b^2+7b-8} = \frac{1}{b+9} \cdot \frac{(b+8)(b-1)}{b+8} = \frac{b-1}{b+9}$

6)  $\frac{x+1}{8x^2} \div \frac{x-2}{8x^3-16x^2} = \frac{x+1}{8x^2} \cdot \frac{8x^2(x-2)}{8x^2(x-2)} = \frac{x+1}{x-2}$

7)  $\frac{5(2p+7)}{10p+35} \cdot \frac{15p^2+30p}{3p^2+21p+30} = \frac{25p}{p+5}$

8)  $\frac{6(x-10)}{6x-60} \cdot \frac{(2x+3)(x+5)}{4x^2+18x+18} = \frac{x-10}{2(x+7)}$

Simplify each expression.

9)  $\frac{2}{(m+5)m-4} + \frac{-4(m-4)}{m+5(m-4)} = \frac{2m+10 + -4m+16}{(m+5)(m-4)} = \frac{-2m+6}{(m+5)(m-4)}$

10)  $\frac{6p}{p+3} + \frac{-5(p+3)}{2p+3} = \frac{12p^2+18p - 5p-15}{(2p+3)(p+3)} = \frac{12p^2+13p-15}{(2p+3)(p+3)}$

11)  $\frac{5}{(n+6)^3} + \frac{-4n+3}{n+6} = \frac{5n+30 - 4n^2-24n-36}{3(n+6)^3} = \frac{-4n^2-19n-6}{3(n+6)^3}$

12)  $\frac{6v}{v-2} + \frac{2(v-2)}{v-6} = \frac{6v^2-12v + 2v-4}{(v-6)(v-2)} = \frac{6v^2-10v-4}{(v-6)(v-2)}$

13)  $\frac{25}{u^2} \div \frac{2}{u^2} = \frac{25}{2}$

14)  $\frac{4}{x^2} \div \frac{x^2}{16} = \frac{4}{16} = \frac{1}{4}$

15)  $\frac{6}{m^2} \div \frac{3}{2} = \frac{4}{m^2}$

16)  $\frac{5}{u^2} \div \frac{4u}{5} = \frac{4}{u}$



Solve each equation. Remember to check for extraneous solutions.

$$17) \frac{8n^2}{n-4} = \frac{8n^2}{8n} + \frac{8n^2}{8n^2}$$

$$2n-8 = n-1$$

$$n-8 = -1$$

$$\boxed{n=7}$$

$$19) \frac{5}{n} = \frac{1}{n} + 5$$

$$5 = 1 + 5n$$

$$4 = 5n$$

$$\boxed{n = \frac{4}{5}}$$

$$18) \frac{1}{3b} = \frac{1}{3} + \frac{1}{b}$$

$$1 = b + 3$$

$$\boxed{b = -2}$$

$$20) \frac{n+8}{n+8} = \frac{n+8}{n+8} - 1$$

$$3 = 1 - n - 8$$

$$3 = -n - 7$$

$$10 = -n$$

$$\boxed{n = 10}$$

Use the following data set for problems #21 -

21) Find the mean, median, and mode of the set of data.

$\bar{x} = 19.09$  mode = 15  
median = 14

23) Find the standard deviation and the variance for the set of data above. Do it by hand as well as using a calculator.

25) Explain how removing the outlier from the data above would affect the mean and standard deviation. The mean would

go down  $\frac{1}{2}$

17, 15, 8, 14, 21, 87, 10, 15, 7, 5, 11

5, 7, 8, 10, 11, 14, 15, 15, 17, 21, 87

22) Create a 5 number summary, find the IQR, and create a box and whisker plot for the data above. min=5 Q1=8 Q2=14 Q3=17 max=87

IQR = 17 - 8 = 9

24) Find the intervals for outliers from the data above and identify any outliers that are present.

$(\bar{x} - 3\sigma, \bar{x} + 3\sigma)$   
 $(19.09 - 3(21.94), 19.09 + 3(21.94))$   
 $(-46.73, 84.91)$   
87 is an outlier

Tell whether the following is an experiment or observational study. Explain in complete sentences.

26) The owner of the near by Chick-fil-a wants to find out how many people like the new carrot salad. He analyzes the data taken from the cash register at the end of the day to see totals of items sold. This is an observational study b/c the owner is observing what happened w/o applying a treatment. Describe the treatment, the treatment group, and the control group.

27) Mrs. Oldeen wants to find out how much behavior affects her students learning. She strictly enforces the rules in one class and doesn't enforce any rules in the other class. At the end of the semester she compares the grades in both classes. This is an experiment b/c she is choosing which class to enforce rules in.

28) Mrs. Davis wants to know the difference that playing classical music during a test has on her students. During her first period class' test, she plays classical music. During 2nd period, she plays no music at all. Lastly, she compares the results.

treatment: classical music  
TG: 1<sup>st</sup> period  
CG: 2<sup>nd</sup> period

Decide whether the following sampling methods could result in bias or not. Explain why.

29) You want to find out which of your peers likes Justin Bieber. You decide to put a message on Twitter asking people to 'dm' you if they like the biebs. Biased - not everyone has twitter, not everyone will reply

30) Bobby is trying to find out how many people like Sushi in his school. He does a computer generated random sample of the entire school and polls 100 people. Unbiased - everyone had a chance to be chosen