

Algebra 2

Name \_\_\_\_\_

Test Review 3.1

Period \_\_\_\_

Simplify. You must show work.

1)  $8\sqrt{24x^4y^5}$

$$8(2)\sqrt{6x^4y^4}$$

$$\underline{16x^2y^2\sqrt{6y}}$$

$$2 \begin{array}{r} 2 \overline{) 24} \\ 4 \\ \hline 2 \overline{) 12} \\ 6 \\ \hline 2 \overline{) 6} \\ 3 \end{array}$$

2)  $8\sqrt{18x^4y^3}$

3)  $7\sqrt{245x^7y^8}$

4)  $\sqrt{10}(\sqrt{2} + \sqrt{5})$

$$\sqrt{10} \begin{array}{|c|c|} \hline \sqrt{2} & +\sqrt{5} \\ \hline \sqrt{20} & +\sqrt{50} \\ \hline \end{array}$$

$$\underline{2\sqrt{5} + 5\sqrt{2}}$$

$$2 \begin{array}{r} 2 \overline{) 20} \\ 4 \\ \hline 2 \overline{) 10} \\ 5 \end{array}$$

$$5 \begin{array}{r} 5 \overline{) 50} \\ 25 \\ \hline 25 \end{array}$$

5)  $\sqrt{2}(\sqrt{6} + \sqrt{2})$

6)  $\sqrt{15}(\sqrt{3} + \sqrt{5})$

7)  $-\sqrt{5}(-3\sqrt{5} - \sqrt{3})$

$$-\sqrt{5} \begin{array}{|c|c|} \hline -3\sqrt{5} & -\sqrt{3} \\ \hline 3(5) & +\sqrt{15} \\ \hline \end{array}$$

$$3(5) + \sqrt{15}$$

$$\underline{15 + \sqrt{15}}$$

8)  $-2\sqrt{6}(-5\sqrt{2} + 4)$

$$3 \overline{) 15}$$

9)  $-3x\sqrt{125x^3} - 4\sqrt{45x^5}$

10)  $-3\sqrt{80x^5} + x^2\sqrt{20x}$

$-3(2)(2)\sqrt{5x^4}$

$-12x^2\sqrt{5x} + x^2(2)\sqrt{5x}$

$-12x^2\sqrt{5x} + 2x^2\sqrt{5x}$

$-10x^2\sqrt{5x}$

2 | 80  
2 | 40  
2 | 20  
2 | 10  
5

Express the product in simplest form. You must show work.

11)  $(-2 - 2\sqrt{50})(5 + \sqrt{2})$

12)  $(-5 - 2\sqrt{3})(-1 - \sqrt{12})$

	5	$+\sqrt{2}$
$-2$	$-10$	$-2\sqrt{2}$
$-2\sqrt{50}$	$-10\sqrt{50}$	$-2\sqrt{100}$

2 | 50  
5 | 25  
5

$-10 - 2\sqrt{2} - 10\sqrt{50} - 2\sqrt{100}$   
 $-10(5)\sqrt{2} - 2(10)$

$-10 - 2\sqrt{2} - 50\sqrt{2} - 20 = -30 - 52\sqrt{2}$

13)  $(3 - \sqrt{7x})^2$

14)  $(4 - 2\sqrt{x})^2$

	4	$-2\sqrt{x}$
4	16	$-8\sqrt{x}$
$-2\sqrt{x}$	$-8\sqrt{x}$	4x

$16 - 8\sqrt{x} - 8\sqrt{x} + 4x$

$16 - 16\sqrt{x} + 4x$

Simplify. You must show work.

15)  $\frac{3\sqrt{2} \cdot \sqrt{5}}{5\sqrt{5} \cdot \sqrt{5}} = \frac{3\sqrt{10}}{5(5)}$   
 $= \frac{3\sqrt{10}}{25}$

16)  $\frac{3\sqrt{5}}{\sqrt{3}}$

17)  $\frac{\sqrt{2}}{\sqrt{5}}$

18)  $\frac{\sqrt{5}}{3\sqrt{3}}$

$$\begin{array}{|c|c|c|} \hline & -2 & +\sqrt{3} \\ \hline -2 & 4 & -2\sqrt{3} \\ \hline -\sqrt{3} & 2\sqrt{3} & -3 \\ \hline \end{array}$$

19)  $\frac{(-2+\sqrt{3})}{(-2-\sqrt{3})(-2+\sqrt{3})}$

$$\frac{-6 + 3\sqrt{3}}{4 - 2\sqrt{3} + 2\sqrt{3} - 3} = \frac{-6 + 3\sqrt{3}}{1} = -6 + 3\sqrt{3}$$

20)  $\frac{3}{-3 + \sqrt{5}}$

Use synthetic division with the given zero. Finish by factoring, and then solve to find all zeros. The answers will be in the form  $x = \#$ . YOU MUST SHOW WORK.

21)  $f(x) = x^3 - 6x^2 - 7x + 60$       5

$$\begin{array}{r|rrrr} 5 & 1 & -6 & -7 & 60 \\ & & 5 & -5 & -60 \\ \hline & 1 & -1 & -12 & 0 \end{array}$$

$x^2 - x - 12$   
 $(x-4)(x+3)$   
 $x-4=0 \quad x+3=0$   
 $x=4 \quad x=-3$

4, -3, 5

22)  $f(x) = x^3 + 10x^2 + 31x + 30; -2$

Using the given zeros, write the polynomial function in factored form and in standard form. YOU MUST SHOW WORK.

23) 0, -3, 4

$$(x-0)(x+3)(x-4)$$

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

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

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

24) 0, 4, 5

25) -3, -3i, 3i

26) -1, i, -i

$$(x+1)(x-i)(x+i)$$

$$x^2 + ix - ix - i^2$$

$$x^2 + 1$$

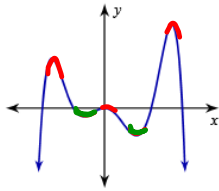
$$(x+1)(x^2+1)$$

$$x^3 + x^2 + x + 1$$

State the number of extrema. How many are maxima, and how many are minima?

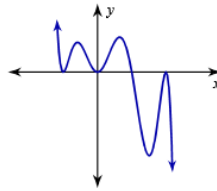
27) 5 extrema

2 minima 3 maxima



28) \_\_\_\_\_ extrema

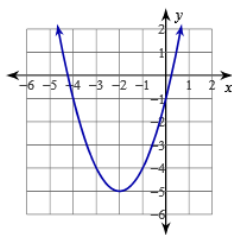
\_\_\_\_\_ minima \_\_\_\_\_ maxima



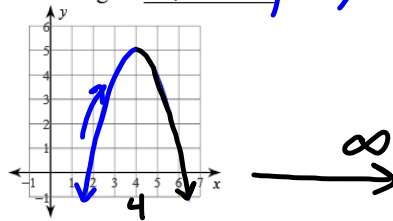
State the intervals upon which the function is increasing or decreasing.

29) decreasing on \_\_\_\_\_

increasing on \_\_\_\_\_



30) decreasing on  $(4, \infty)$   
increasing on  $(-\infty, 4)$



Find all roots by factoring. For roots that are duplicated, state the multiplicity. You must show work. Answers are in the form  $x = \#$ .

31)  $x^4 - 9x^2 + 20 = 0$

32)  $x^4 + x^2 - 42 = 0$

$(x^2 - 4)(x^2 - 5) = 0$   
 $x^2 - 4 = 0$      $x^2 - 5 = 0$   
 $\sqrt{x^2} = \sqrt{4}$      $\sqrt{x^2} = \sqrt{5}$   
 $x = \boxed{\pm 2}$      $x = \boxed{\pm \sqrt{5}}$

Divide by using long division. You must show work.

33)  $(32n^2 - 55) \div (4n + 5)$

34)  $(81x^2 - 54x - 16) \div (9x - 8)$

$$\begin{array}{r} 32n^2 + 0n - 55 \\ \underline{4n+5 \phantom{00} 8n - 10 + \frac{-5}{4n+5}} \\ 4n+5 \overline{) 32n^2 + 0n - 55} \\ \underline{-32n^2 + 40n} \phantom{-55} \\ \phantom{4n+5} -40n - 55 \\ \underline{\phantom{4n+5} +40n + 50} \\ \phantom{4n+5} \phantom{-40n} -5 \end{array}$$