

Review for Math 0320 Final Exam

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①

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Factor the GCF from the polynomial.

1) $2x + 4$

Answer: $2(x + 2)$

$2x + 4 =$
 $2(x + 2) =$

$4 \cdot 1$
 $2 \cdot 2$

1) _____

2) $4x^5 + 16x^3$

Answer: $4x^3(x^2 + 4)$

$4x^5 + 16x^3 =$
 $4x^3(x^2 + 4) =$

$16 \cdot 1$
 $2 \cdot 8$
 $4 \cdot 4$

2) _____

Factor the trinomial completely. If the trinomial cannot be factored, say it is prime.

3) $x^2 + x - 20$

Answer: $(x - 4)(x + 5)$

$x^2 + x - 20 =$
 $(x - 4)(x + 5) =$

$20 \cdot 1$
 $10 \cdot 2$
 $4 \cdot 5$

3) _____

4) $x^2 + 2x - 35$

Answer: $(x + 7)(x - 5)$

$x^2 + 2x - 35 =$
 $(x - 5)(x + 7) =$

$35 \cdot 1$
 $5 \cdot 7$

4) _____

Factor the polynomial completely. If the polynomial is prime, state so.

5) $10x^2 + 23x - 5$

Answer: $(2x + 5)(5x - 1)$

$10x^2 + 23x - 5 =$
 $(2x + 5)(5x - 1) =$

$10 \cdot 1$
 $2 \cdot 5$

$5 \cdot 1$

5) _____

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2.

6) $9a^2 + 15ab + 4b^2$

Answer: $(3a + b)(3a + 4b)$

$$9a^2 + 15ab + 4b^2 =$$

$$(3a+b)(3a+4b) =$$

6) _____

9.1	4.1
3.3	2.2

Factor completely. If the polynomial is prime, state so.

7) $81x^2 - 64$

Answer: $(9x + 8)(9x - 8)$

$$a^2 - b^2 = (a+b)(a-b)$$

$$81x^2 - 64 =$$

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

$$(9x+8)(9x-8) =$$

7) _____

9.9	8.8
-----	-----

8) $s^2z^2 - 1$

Answer: $(sz + 1)(sz - 1)$

$$a^2 - b^2 = (a+b)(a-b)$$

$$s^2z^2 - 1 =$$

$$(sz)^2 - (1)^2 =$$

$$(sz+1)(sz-1) =$$

8) _____

1.1

Factor completely. If a polynomial cannot be factored, say it is prime.

9) $6x^2 - 20x + 2x^3$

Answer: $2x(x - 2)(x + 5)$

$$6x^2 - 20x + 2x^3 =$$

$$2x^3 + 6x^2 - 20x =$$

$$2x(x^2 + 3x - 10) =$$

$$2x(x-2)(x+5) =$$

9) _____

10.1	2.5
------	-----

10) $3t^5 - 3t^4 - 60t^3$

Answer: $3t^3(t + 4)(t - 5)$

$$3t^5 - 3t^4 - 60t^3 =$$

$$3t^3(t^2 - t - 20) =$$

$$3t^3(t+4)(t-5) =$$

10) _____

20.1	10.2	4.5
------	------	-----

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3

Solve the equation by factoring.

11) $x^2 - 17x + 72 = 0$

Answer: {9, 8}

Solve
 $x^2 - 17x + 72 = 0$
 $(x-8)(x-9) = 0$
 $x-8=0$ OR $x-9=0$
 $x-8+8=0+8$ OR $x-9+9=0+9$
 $x=8$ OR $x=9$

11) _____

12) $2x^2 - 16x + 30 = 0$

Answer: {3, 5}

Solve
 $2x^2 - 16x + 30 = 0$
 $2(x^2 - 8x + 15) = 0$
 $2(x-3)(x-5) = 0$
 $2 \neq 0$ OR $x-3=0$ OR $x-5=0$
 $x-3+3=0+3$ OR $x-5+5=0+5$
 $x=3$ OR $x=5$

12) _____

Simplify the rational expression. Assume that no variable has a value which results in a denominator with a value of zero.

13) $\frac{12}{2m - 12}$

Answer: $\frac{6}{m - 6}$

$\frac{12}{2m-12} =$
 $\frac{2(6)}{2(m-6)} =$
 $\frac{6}{m-6} =$

13) _____

14) $\frac{5x - 25}{x^2 - 25}$

Answer: $\frac{5}{x + 5}$

$\frac{5x-25}{x^2-25} =$
 $\frac{5x-25}{(x)^2-(5)^2} =$
 $\frac{5(x-5)}{(x+5)(x-5)} =$
 $\frac{5}{x+5} =$

14) _____

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4.

Perform the indicated operation.

15) $\frac{8m^2p}{33p^4} \cdot \frac{11mp^3}{24m^7} = \frac{2 \cdot 2 \cdot 2 \cdot m \cdot m \cdot p}{3 \cdot 11 \cdot p \cdot p \cdot p \cdot p} \cdot \frac{11 \cdot m \cdot p \cdot p \cdot p}{2 \cdot 2 \cdot 2 \cdot 3 \cdot m \cdot m \cdot m \cdot m \cdot m \cdot m} =$ 15) _____

Answer: $\frac{1}{9m^4}$

16) $\frac{3m^2c}{5mc^2} \div \frac{15m^2c^2}{12mc} = \frac{3m^2c}{5mc^2} \cdot \frac{12mc}{15m^2c^2} =$ 16) _____

Answer: $\frac{12}{25c^2}$

17) $\frac{m^2 - 9m}{m - 6} + \frac{18}{m - 6} = \frac{(m^2 - 9m) + (18)}{m - 6}$ 17) _____

Answer: $m - 3$

18) $\frac{5x}{x - 2} - \frac{10}{x - 2} =$ 18) _____

Answer: 5

Find the function value.

19) Find $f(3)$ when $f(x) = x^2 + 3x - 4$. 19) _____

Answer: 14

$f(3) = (3)^2 + 3(3) - 4$
 $f(3) = (3)(3) + 3(3) - 4$
 $f(3) = 9 + 9 - 4$
 $f(3) = 18 - 4$
 $f(3) = 14$

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5

20) Find $f(4)$ when $f(x) = 3 - 5x^2$.

Answer: -77

$$f(4) = 3 - 5(4)^2$$

$$f(4) = 3 - 5(4)(4)$$

$$f(4) = 3 - 5(16)$$

$$f(4) = 3 - 80$$

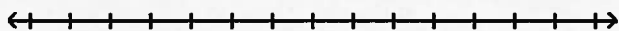
$$f(4) = -77$$

20) _____

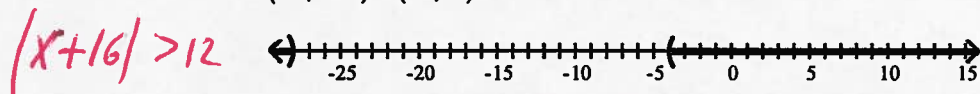
Solve the inequality. Graph the solution set, and state the solution set in interval notation.

21) $|x + 16| > 12$

21) _____



Answer: $(-\infty, -28) \cup (-4, \infty)$



$$x + 16 < -12 \quad \text{OR} \quad x + 16 > 12$$

$$x + 16 - 16 < -12 - 16 \quad \text{OR} \quad x + 16 - 16 > 12 - 16$$

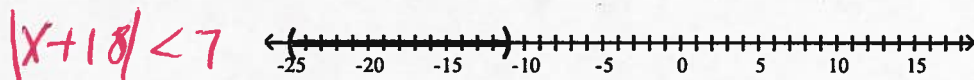
$$x < -28 \quad \text{OR} \quad x > -4$$

22) $|x + 18| < 7$

22) _____



Answer: $(-25, -11)$



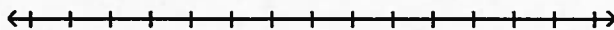
$$-7 < x + 18 < 7$$

$$-7 - 18 < x + 18 - 18 < 7 - 18$$

$$-25 < x < -11$$

23) $|8k - 6| \geq 3$

23) _____



Answer: $(-\infty, \frac{3}{8}] \cup [\frac{9}{8}, \infty)$

$$|8k - 6| \geq 3$$



$$8k - 6 \leq -3 \quad \text{OR} \quad 8k - 6 \geq 3$$

$$8k - 6 + 6 \leq -3 + 6 \quad \text{OR} \quad 8k - 6 + 6 \geq 3 + 6$$

$$8k \leq 3 \quad \text{OR} \quad 8k \geq 9$$

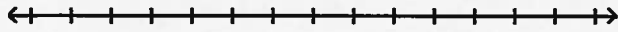
$$\frac{8k}{8} \leq \frac{3}{8} \quad \text{OR} \quad \frac{8k}{8} \geq \frac{9}{8}$$

$$k \leq \frac{3}{8} \quad \text{OR} \quad k \geq \frac{9}{8}$$

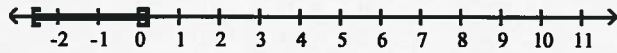
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6.

24) $|5k + 6| \leq 7$



Answer: $[-\frac{13}{5}, \frac{1}{5}]$



$|5k + 6| \leq 7$ 24) _____
 $-7 \leq 5k + 6 \leq 7$
 $-7 - 6 \leq 5k + 6 - 6 \leq 7 - 6$
 $-13 \leq 5k \leq 1$
 $-\frac{13}{5} \leq \frac{5k}{5} \leq \frac{1}{5}$
 $-\frac{13}{5} \leq k \leq \frac{1}{5}$

Solve the absolute value equation.

25) $|5x| + 8 = 14$

Answer: $\{\frac{6}{5}, -\frac{6}{5}\}$

$|5x| + 8 = 14$
 $|5x| + 8 - 8 = 14 - 8$
 $|5x| = 6$
 $5x = -6$ OR $5x = 6$
 $\frac{5x}{5} = \frac{-6}{5}$ OR $\frac{5x}{5} = \frac{6}{5}$
 $x = -\frac{6}{5}$ OR $x = \frac{6}{5}$

25) _____

26) $|8x + 7| = 8$

Answer: $\{\frac{1}{8}, -\frac{15}{8}\}$

$|8x + 7| = 8$
 $8x + 7 = -8$ OR $8x + 7 = 8$
 $8x + 7 - 7 = -8 - 7$ OR $8x + 7 - 7 = 8 - 7$
 $8x = -15$ OR $8x = 1$
 $\frac{8x}{8} = \frac{-15}{8}$ OR $\frac{8x}{8} = \frac{1}{8}$
 $x = -\frac{15}{8}$ OR $x = \frac{1}{8}$

26) _____

Simplify the square root.

27) $\sqrt{(x-2)^2}$

Answer: $|x - 2|$

$\sqrt{(x-2)^2} =$
 $|x-2| =$

27) _____

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

Answer: $|4x - 3|$

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

28) _____

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7.

Evaluate the expression, if possible.

29) $4^{-1/2}$

Answer: $\frac{1}{2}$

$$= \frac{1}{4^{1/2}}$$

$$= \frac{1}{(2^2)^{1/2}}$$

$$= \frac{1}{2^{2 \cdot (1/2)}}$$

$$= \frac{1}{2^1} = \frac{1}{2}$$

29) _____

30) $27^{2/3}$

Answer: 9

$$27^{2/3} = (3^3)^{2/3} = 3^{3 \cdot (2/3)} = 3^2 = (3)(3) = 9$$

30) _____

Simplify the radical expression. Assume that all variables represent positive real numbers.

31) $\sqrt{w^{22}}$

Answer: w^{11}

$$\sqrt{w^{22}} = w^{11}$$

31) _____

32) $\sqrt{300k^7q^8}$

Answer: $10k^3q^4\sqrt{3k}$

$$= \sqrt{100 \cdot 3 \cdot k^6 \cdot k^1 \cdot q^8}$$

$$= 10k^3q^4\sqrt{3k}$$

2 | 300
2 | 150
3 | 75
5 | 25
5 | 5
1

Primes 2, 3, 5, 7

32) _____

Use the product rule to simplify the expression. Assume that the variables can be any real number.

33) $\sqrt[3]{-512}$

Answer: -8

$$\sqrt[3]{(-8)^3} =$$

$$(-8)^1 =$$

$$-8 =$$

2 | 512
2 | 256
2 | 128
2 | 64
2 | 32
2 | 16
2 | 8
2 | 4
2 | 2
1

Primes 2, 3, 5, 7, ...

33) _____

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Primes 2, 3, 5, 7, ...

34) $\sqrt[4]{6480}$


Answer: $6\sqrt[4]{5}$

$$= \sqrt[4]{6^4 \times 5}$$

$$= 6\sqrt[4]{5}$$

$$\begin{array}{r} 2 \overline{)6480} \\ \underline{12840} \\ 2 \overline{)3240} \\ \underline{6480} \\ 2 \overline{)1620} \\ \underline{3240} \\ 3 \overline{)405} \\ \underline{135} \\ 3 \overline{)45} \\ \underline{15} \\ 3 \overline{)15} \\ \underline{15} \\ 0 \end{array}$$

34) _____



Solve the equation.

35) $\sqrt{x+5} = 6$

Answer: {31}

$$(\sqrt{x+5})^2 = (6)^2$$

$$x+5 = 36$$

$$x + \cancel{5} - \cancel{5} = 36 - 5$$

$$x = 31$$

35) _____

36) $\sqrt{x+4} - 6 = 0$

Answer: {32}

$$\sqrt{x+4} - \cancel{6} + \cancel{6} = 0 + 6$$

$$\sqrt{x+4} = 6$$

$$(\sqrt{x+4})^2 = (6)^2$$

$$x+4 = 36$$

$$x + 4 - 4 = 36 - 4$$

$$x = 32$$

36) _____

Add or subtract.

37) $(8 + 6i) - (-4 + i)$

Answer: $12 + 5i$

$$= 8 + 6i + 4 - i =$$

$$8 + 6i + 4 - 1i =$$

$$12 + 5i =$$

37) _____

38) $7i + (-7 - i)$

Answer: $-7 + 6i$

$$= 7i - 7 - i =$$

$$7i - 7 - 1i =$$

$$-7 + 6i =$$

38) _____

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Multiply. Write the result in the form $a + bi$.

39) $(2 - 6i)(7 - 8i) = 14 - 16i - 42i + 48i^2 =$
 $14 - 58i + 48i^2 =$
 $14 - 58i + 48(-1) =$
 $14 - 58i - 48 =$
 $-34 - 58i =$

39) _____

40) $(6 + 2i)(4 + 3i) = 24 + 18i + 8i + 6i^2 =$
 $24 + 26i + 6i^2 =$
 $24 + 26i + 6(-1) =$
 $24 + 26i - 6 =$
 $18 + 26i =$

40) _____

Divide.

41) $\frac{4}{5 - 8i}$
 Answer: $\frac{20}{89} + \frac{32i}{89}$

$\left(\frac{4}{5 - 8i}\right)\left(\frac{5 + 8i}{5 + 8i}\right) =$
 $\frac{20 + 32i}{25 + 40i - 40i - 64i^2} =$
 $\frac{20 + 32i}{25 - 64i^2} =$
 $\frac{20 + 32i}{25 - 64(-1)} =$
 $\frac{20 + 32i}{25 + 64} =$
 $\frac{20 + 32i}{89} = \frac{20}{89} + \frac{32i}{89}$

41) _____

42) $\frac{1 + i}{-1 - i}$
 Answer: -1

$\left(\frac{1 + i}{-1 - i}\right)\left(\frac{-1 + i}{-1 + i}\right) =$
 $\frac{-1 + i^2 - i + i^2}{1 - i + i - i^2} =$
 $\frac{-1 + (-1) - i + (-1)}{1 - (-1)} =$
 $\frac{-1 - 1 - i - 1}{1 + 1} =$
 $\frac{-2 - i}{2} =$

42) _____

Use the square root property to solve the equation.

43) $(2x - 3)^2 = 9$
 Answer: {3, 0}

$\sqrt{(2x - 3)^2} = \pm\sqrt{9}$
 $2x - 3 = \pm 3$
 $2x - 3 = -3$ OR $2x - 3 = 3$
 $2x - 3 + 3 = -3 + 3$ OR $2x - 3 + 3 = 3 + 3$
 $2x = 0$ OR $2x = 6$
 $\frac{2x}{2} = \frac{0}{2}$ OR $\frac{2x}{2} = \frac{6}{2}$
 $x = 0$ OR $x = 3$

43) _____

44) $(4x + 2)^2 = 36$
 Answer: {1, -2}

$\sqrt{(4x + 2)^2} = \pm\sqrt{36}$
 $4x + 2 = \pm 6$
 $4x + 2 = -6$ OR $4x + 2 = 6$
 $4x + 2 - 2 = -6 - 2$ OR $4x + 2 - 2 = 6 - 2$
 $4x = -8$ OR $4x = 4$
 $\frac{4x}{4} = \frac{-8}{4}$ OR $\frac{4x}{4} = \frac{4}{4}$
 $x = -2$ OR $x = 1$

44) _____

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50) $\sqrt[3]{343x^4y^5}$

Answer: $7xy\sqrt[3]{xy^2}$

$$= \sqrt[3]{7^3 x^3 x^1 y^3 y^2}$$

$$= 7^1 x^1 y^1 \sqrt[3]{x^1 y^2}$$

$$= 7xy \sqrt[3]{xy^2}$$

Primes 2, 3, 5, 7, ...

$$\begin{array}{r} 7 \overline{) 343} \\ 7 \overline{) 49} \\ 7 \overline{) 7} \\ 1 \end{array}$$

50) 11.

Use the quadratic formula to solve the equation.

51) $2x^2 - 7x - 9 = 0$

Answer: $\left\{\frac{9}{2}, -1\right\}$

$a=2, b=-7, c=-9$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(-9)}}{2(2)}$$

$$x = \frac{7 \pm \sqrt{49 + 72}}{4}$$

$$x = \frac{7 \pm \sqrt{121}}{4}$$

$$x = \frac{7 \pm 11}{4}$$

$$x = \frac{7-11}{4} \text{ OR } x = \frac{7+11}{4}$$

$$x = \frac{-4}{4} \text{ OR } x = \frac{18}{4}$$

$$x = -1 \text{ OR } x = \frac{2(9)}{2(2)}$$

$$\text{OR } x = \frac{9}{2}$$

51) _____

52) $3x^2 + 10x + 4 = 0$

Answer: $\left\{\frac{-5 - \sqrt{13}}{3}, \frac{-5 + \sqrt{13}}{3}\right\}$

$a=3, b=10, c=4$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(10) \pm \sqrt{(10)^2 - 4(3)(4)}}{2(3)}$$

$$x = \frac{-10 \pm \sqrt{100 - 48}}{6}$$

$$x = \frac{-10 \pm \sqrt{52}}{6}$$

$$x = \frac{-10 \pm \sqrt{4 \cdot 13}}{6}$$

$$x = \frac{-10 \pm \sqrt{4} \sqrt{13}}{6}$$

$$x = \frac{-10 \pm 2\sqrt{13}}{6}$$

$$x = \frac{-5 \pm \sqrt{13}}{3}$$

$$x = \frac{-5 \pm \sqrt{13}}{3}$$

$$x = \frac{-5 \pm \sqrt{13}}{3}$$

$$x = \frac{-5 - \sqrt{13}}{3}$$

$$\text{OR } x = \frac{-5 + \sqrt{13}}{3}$$

52) _____

Primes 2, 3, 5, 7, 11, 13

$$\begin{array}{r} 2 \overline{) 52} \quad 13 \\ 2 \overline{) 26} \\ 13 \overline{) 13} \\ 1 \end{array}$$