Answers

Algebra I-3

Final Exam Review 2016-2017

Chapter 7 Review (Comp 1)

Simplify the following expressions with positive exponents. Leave solutions in exponent form unless you can evaluate the expression without a calculator.

1. $8^3 \cdot 8^5$

8^8

2. $\frac{9^8}{9^2}$

9^6

3. $\left(\frac{2^6}{2^2}\right)^3$

$\frac{2^{12}}{2^6} = 2^{12}$

OR $(2^4)^3 = 2^{12}$

4. $\left(\frac{3^x}{6^2}\right)^0$

1

5. $\left(\frac{3}{5}\right)^{-2}$

$\frac{25}{9}$

6. $6^{-5} \cdot 6^0 \cdot 6^4$

$\frac{6^4}{6^5} = \frac{1}{6}$

7. $(3y^3)^3$

$27y^9$

8. $(y^0)^{-2}$

1

9. $x^3y^{-2} \cdot y^3x$

x^4y

10. $2xy^3 \cdot 3x^2y$

$6x^3y^4$

11. $(4xy^3)^{-2}$

$\frac{1}{16x^2y^6}$

12. $2m^2n^{-1} \cdot 4m^{-4}n^2$

$\frac{8n}{m^2}$

13. $\frac{(x^2y^3)^2}{x^3y^{-1}}$

$\frac{x^4y^6y}{x^3}$

xy^7

14. $\frac{9x^3y^4}{3x^3y^2}$

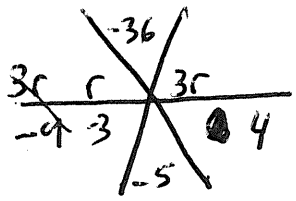
$3y^2$

15. $\frac{2x^{-2}y^5}{6x^3y^2}$

$\frac{y^3}{3x^5}$

Factor the following.

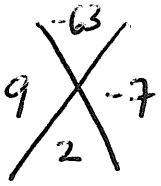
16. $6r^2 - 10r - 24$

$2(3r^2 - 5r - 12) \longrightarrow$ 

$2(3r + 4)(r - 3)$

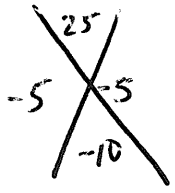
17. $n^2 + 2n - 63$

$(n + 9)(n - 7)$



18. $x^2 - 9$ $\longrightarrow$ 

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

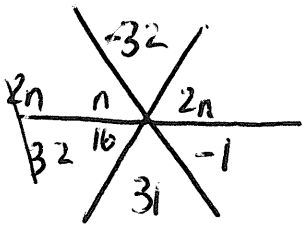
19. $x^2 - 10x + 25$ $\longrightarrow$ 

$(x - 5)^2$

20. $4n^2 + 62n - 32$

$2(2n^2 + 31n - 16)$

$2(2n - 1)(n + 16)$



21. $16x^2 - 49$ $\longrightarrow$ Difference of 2 squares

$(4x - 7)(4x + 7)$

$\sqrt{16x^2} = 4x$

$\sqrt{49} = 7$

Factor the following polynomials by *grouping*.

22. $6d^4 + 4d^3 - 6d^2 - 4d$

$2d(3d^3 + 2d^2 - 3d - 2)$

$2d(d^2(3d+2) - 1(3d+2))$

$2d(d^2-1)(3d+2)$

↑ Diff of 2 squares

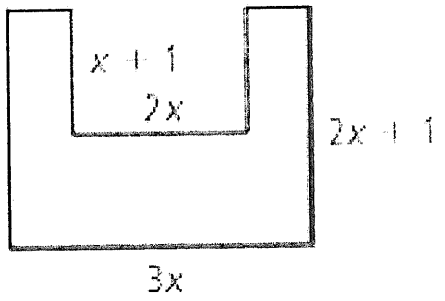
$2d(d-1)(d+1)(3d+2)$

23. $45z^3 + 20z^2 + 9z + 4$

$5z^2(9z+4) + 1(9z+4)$

$(5z^2+1)(9z+4)$

24. Find the perimeter and area of the figure below.



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

$12x + 4$ perimeter

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

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

Chapter 9 (Comp 3)

1. List the three quadratic functions below from widest to narrowest:

   a) $y=-7x^2+2x-9$

   b) $y=-\frac{1}{7}(x-5)(x+2)$

   c) $y=(x-2)^2+5$

b, c, a

2. What is the parent quadratic function? $y =$ x^2

Now, fill in the following x/y table:

x	$y=x^2$
-2	4
-1	1
0	0
1	1
2	4
3	9

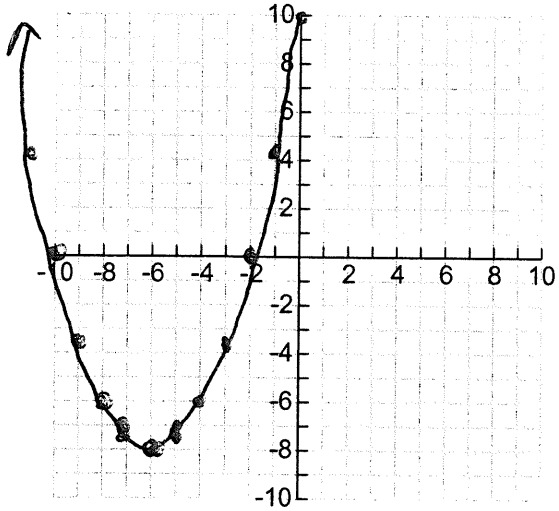
3. Graph $y=\frac{1}{2}x^2+6x+10$

$\frac{-b}{2a} = \frac{-6}{1}$

$18-36+10 = -18+10 = -8$

Vertex $(-6,-8)$

x	$y=x^2$	$y=\frac{1}{2}x^2$
1	1	½
2	4	2
3	9	4.5
4	16	8

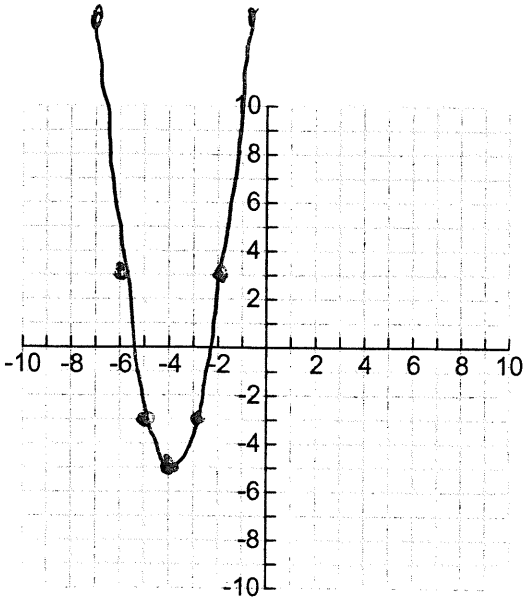


Domain: All real #'s

Range: $y \geq -8$

4. Graph $y=2(x+4)^2-5$

x	$y=x^2$	$y=2x^2$
1	1	2
2	4	8
3	9	18
4	16	32



Domain: All real #s

Range: $y \geq -5$

5. Re-write the function $y=-3x^2+6x-7$ into vertex form.

$\frac{-b}{2a} = \frac{-6}{-6} = 1$ $\quad (1, -4)$

$y = -3(x-1)^2 - 4$

$y = -3(1)^2 + 6(1) - 7$

$y = -3(1) + 6 - 7$

$y = -3 + 6 - 7$ $\quad y = 3 - 7 \rightarrow y = -4$

6. Re-write the function $y=5(x-1)^2-10$ into standard form.

$y = 5[(x-1)(x-1)] - 10$

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

$y = 5x^2 - 10x + 5 - 10$

$y = 5x^2 - 10x - 5$

7. You are standing atop a 30 foot building. You punt a football from the edge of the rooftop. It leaves your foot at an initial velocity of 25 ft/sec. The equation for the projectile motion is $h(t) = -16t^2 + v_0 t + h_0$, where h_0 is the initial height of the object and v_0 is the initial velocity.

a. Determine when (how much time it takes) the ball reaches its *maximum* height.

$h = -16t^2 + 25t + 30$ $\quad \frac{-b}{2a} = \frac{-25}{-32} = \frac{25}{32}$

$\frac{25}{32}$ seconds $=$ 0.78125 seconds

b. Determine the maximum height of the ball.

$h = -16\left(\frac{625}{1024}\right) + 25\left(\frac{25}{32}\right) + 30$

$h = -\frac{625}{64} + \frac{625}{32} + 30$

$h = \frac{625}{64} + 30$

$h = 39.7$ ft

Chapter 8 Review (Comp 2)

Write the following in standard form. Give the name of the degree and number of terms.

1. $4r+3-9r^2+7r$

$-9r^2+11r+3$

Quadratic trinomial

2. $3+8t^3$ $8t^3+3$

Cubic binomial

Add or subtract the following. Write your answer in standard form.

3. $(7t^2+9)+(6t^2+8)$

$13t^2+17$

4. $(3m^2+2m-8)-(4m^2-5m+6)$

$3m^2+2m-8-4m^2+5m-6$

$-m^2+7m-14$

Multiply the following.

5. $5k(3-4k)$

$15k-20k^2$

$=-20k^2+15k$

6. $-7y^3(4y^2+y-3)$

$-28y^5+-7y^4+21y^3$

Find the GCF (greatest common factor) of the following. Then, factor out the GCF

7. $12p^4+16p^3+8p$

GCF: $4p$

Factor out GCF:

$4p(3p^3+8p^2+2)$

8. $30h^5-6h^4$

GCF: $6h^4$

Factor out GCF:

$6h^4(5h-1)$

Find the product of the following.

9. $(3a+7)(3a-7)$ = $3a(3a-7)+7(3a-7)$

$9a^2-21a+21a-49$

$9a^2-49$

10. $(3x-1)(x-6)$ = $3x(x-6)-1(x-6)$

$3x^2-18x-x+6$

$3x^2-19x+6$

11. $(2z-3)^2$

$(2z-3)(2z-3)=2z(2z-3)-3(2z-3)$

$4z^2-6z-6z+9$

$4z^2-12z+9$

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

$x^3+5x^2-2x-4x^2-20x+8$

$x^3+x^2-22x+8$

13. A rectangle has dimensions $3x+5$ *and* $x+7$. Write an expression for the area of the rectangle.

$(3x+5)(x+7)=3x^2+21x+5x+35$

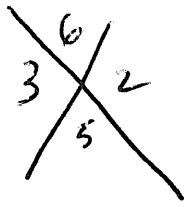
$3x^2+26x+35$

$3x(x+7)+5(x+7)$

Factor the followng trinomials.

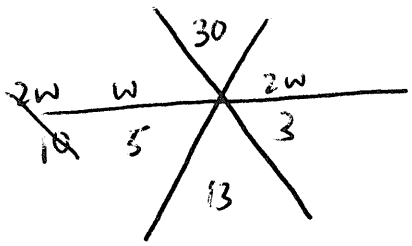
14. y^2+5y+6

$(y+3)(y+2)$



15. $2w^2+13w+15$

$(2w+3)(w+5)$



Solve the following using square roots.

10. $x^2+4=53$

$\sqrt{x^2}=\sqrt{49}$

$x=\pm 7$

11. $\frac{1}{4}x^2-5=-1$

$4\left(\frac{1}{4}x^2\right)=(4)4$

$\sqrt{x^2}=\sqrt{16}$

$x=\pm 4$

12. $-2(x+4)^2-76=4$

$\frac{-2(x+4)^2}{-2}=\frac{80}{-2}$

$\sqrt{(x+4)^2}=\sqrt{-40}$

$x+4=\sqrt{-40}$

No solution

13. $\frac{1}{2}(5r-7)^2-50=0$

$2\left(\frac{1}{2}(5r-7)^2\right)=(50)2$

$\sqrt{(5r-7)^2}=\sqrt{100}$

$5r-7=\pm 10$

$5r-7=10$ $\quad 5r-7=-10$

$5r=17$ $\quad 5r=-3$

$r=\frac{17}{5}$ $\quad r=\frac{-3}{5}$

Solve the following by factoring.

14. $x^2-2x-35=0$

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

$x=7,-5$

$x-7=0$ $\quad x+5=0$

$x=7$ $\quad x=-5$

15. $x^2-7x+10=0$

$(x-5)(x-2)=0$

$x=5,2$

$x-5=0$ $\quad x-2=0$

$x=5$ $\quad x=2$

16. $2x^2-8x=0$

$2x(x-4)=0$

$2x=0$ $\quad x-4=0$

$x=0,4$

17. $-6x^2=-19x-7$

$6x^2-19x-7=0$

$(2x-7)(3x+1)=0$

$6\cdot -7=-42$

-21 $\quad -19$

$2x-7=0$ $\quad 3x+1=0$

$+7\ +7$ $\quad -1\ -1$

$\frac{2x}{2}=\frac{7}{2}$ $\quad \frac{3x}{3}=\frac{-1}{3}$

$x=7/2$ $\quad x=-1/3$

Solve by factoring.

18. $0 = 8x^2 - 16x + 8$

$8x^2 - 16x + 8 = 0$

$8(x^2 - 2x + 1) = 0$

$1 \cdot 1 = 1$, $-1 + -1 = -2$

$8(x-1)(x-1) = 0$

$x - 1 = 0$

$x = 1$

Solve by using the quadratic formula. Round to the nearest hundredth. By the way, the quadratic formula:

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

19. $-3x^2 + 22x = 16$

$-3x^2 + 22x - 16 = 0$

$x = \frac{-22 \pm \sqrt{484 - 192}}{-6} = 0$

$x = \frac{-22 \pm \sqrt{292}}{-6} = 0$

$x = \frac{-22 \pm 17.09}{-6}$

$\frac{-22 + 17.09}{-6} = 0.82$

$\frac{-22 - 17.09}{-6} = 6.52$

20. $0 = x^2 - 169$

$x = 13, -13$

$x = \frac{0 \pm \sqrt{0^2 - 4(1)(-169)}}{2(1)}$

$x = \frac{0 \pm \sqrt{676}}{2}$

$x = \frac{0 \pm 26}{2}$

$\frac{26}{2} = 13$, $\frac{-26}{2} = -13$

21. $2x^2 + 4x = -5$

$2x^2 + 4x + 5 = 0$

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

$x = \frac{-4 \pm \sqrt{16 - 40}}{4}$

$x = \frac{-4 \pm \sqrt{-24}}{-4}$ ← No real solutions

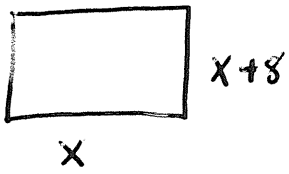
22. $x^2 - 4x + 4 = 0$

$x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(4)}}{2(1)}$

$x = \frac{4 \pm \sqrt{16 - 16}}{2}$

$x = \frac{4 \pm 0}{2}$ → $x = \frac{4}{2} = 2$

23. The length of a rectangle is x and the width is $x+8$. Its area is 48 cm^2. Write a quadratic equation to find out what the length and width should be.



Length = 4 cm
width = 4+8 = 12cm

$A = L \cdot W$

$48 = x(x+8)$

$48 = x^2 + 8x$

$-48 \quad -48$

$0 = x^2 + 8x - 48$

$0 = (x+12)(x-4)$

$x+12=0 \quad x-4=0$

$x = -12 \quad x = 4$

Can't have negative

Length = 12cm

width = 12+8 = 20cm

24. The area of a 45-45-90 right triangle is given by the formula: $A = \frac{1}{2}x^2$, where x is one of the "legs" of the right triangle. If the area of the triangle is 60 square feet, find the length of the "legs." Round your answer to the nearest hundredth.

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

$2(60) = \left(\frac{1}{2}x^2\right)2$

$\sqrt{120} = \sqrt{x^2}$

10.95 ft = x