Indiv. Test

ALGEBRA 2 REGIONAL JANUARY

Directions: Select the best answer from the choices given. If the answer does not appear, use "E. NOTA", which stands for "None Of The Above".

1. If $x+y=4$ and $x-2y=1$, find y.

A. -2 B. 1 C. 3 D. 4 E. NOTA

2. $(7i-4)(3i+2)=a+bi$. Find $a+b$.

A. -27 B. -8 C. 8 D. 13 E. NOTA

3. Find the sum of all x- and y-intercepts of $y=|3x-5|$.

A. $\frac{-20}{3}$ B. $\frac{-5}{3}$ C. $\frac{5}{3}$ D. $\frac{20}{3}$ E. NOTA

4. On February 7, 1986, Chuck Berry and Bruce Springsteen's ages added to 97 years. On February 7, 1972, Chuck Berry was twice as old as Bruce Springsteen. On February 7 of any year after 1950, how many years older is Chuck Berry than Bruce Springsteen?

A. 14 B. 23 C. 37 D. 79 E. NOTA

5. Which point is a focus for the following conic $\frac{(x+2)^2}{16}+\frac{(y-8)^2}{25}=1$?

A. (-5,8) B. (-2,3) C. (-2,11) D. (2,8) E. NOTA

6. Let $4a^2-20ab+25b^2=0$. Find $\frac{a}{b}$.

A. $\frac{-5}{4}$ B. $\frac{-1}{5}$ C. $\frac{4}{5}$ D. $\frac{5}{2}$ E. NOTA

7. What interest rate (rounded to the nearest hundredth of a percent) compounded annually is equivalent to 12% compounded continuously?

A. 1.28% B. 12% C. 12.52% D. 12.75% E. NOTA

8. Find the y-intercept of the graph of *f(x)*: $f(x)=18x^5-3x+54x^4+5-22x^6$.

A. -22 B. 5 C. 6 D. 18 E. NOTA

9. A pump was used to empty a flooded basement. After 3 hours, a second pump was added and the basement was emptied in 8 more hours. The first pump could have done the job alone in 20 hours. How many hours would it take the second pump to do the job alone?

A. 13.33 B. 17.78 C. $13\frac{1}{3}$ D. $17\frac{7}{9}$ E. NOTA

10. Let $x^2\log_{10}8-x\log_{10}5=2(\log_2 10)^{-1}-x$. Find the sum of the solutions.

A. $\frac{-1}{3}$ B. $\frac{3}{5}$ C. $\frac{5}{3}$ D. No Sol'n E. NOTA

11. Evaluate $\begin{vmatrix}6 & 3\\ 1 & 5\end{vmatrix}$.

A. -33 B. 15 C. 27 D. 33 E. NOTA

12. Evaluate $(1-i)^9$.

A. $(1-i^9)$ B. $(1-i)$ C. $(9-9i)$ D. $(16-16i)$ E. NOTA

13. $7^{2x}=3^{x+1}$. Find the thousandths digit of the decimal solution.

A. 1 B. 3 C. 5 D. 7 E. NOTA

14. Find the slope: $3y-2x=5x+y-2$.

A. $\frac{-7}{2}$ B. $\frac{-2}{7}$ C. $\frac{2}{7}$ D. $\frac{7}{2}$ E. NOTA

15. Which is a real solution (or solutions): $9x^2+9y^2=1$ and $x+y^2=1$.

A. $(\pm\frac{1}{3},0)$ B. $(0,\pm\frac{1}{3})$ C. (2,1) D. No Real Sol'ns E. NOTA

16. Find the domain: $\frac{(x-1)^2}{4}-\frac{(y+2)^2}{36}=1$

A. $(-\infty,-8]\cup[4,\infty)$ B. $(-\infty,-1]\cup[3,\infty)$ C. (–8,4)
D. $(-\infty,\infty)$ E. NOTA

17. Find the vertical asymptote: $f(x)=\frac{x^2+6x-55}{x-5}$.

A. x = -55 B. x = -5 C. x = 5 D. None E. NOTA

18. If x any integer, then $(x)(x)$ is _____ a positive product. (Fill in the blank.)

A. Always B. Sometimes C. Never
D. Not Enough Information E. NOTA

19. Let b be any real number and $f(x)=3x^2+bx+2$. The graph of the function $f(x)$ _____ has x-intercepts. (Fill in the blank.)

A. Always B. Sometimes C. Never
D. Not Enough Information E. NOTA

20. Solve: $\frac{x^2+x-6}{x^2+5x+4}<0$.

A. $(-\infty,-3)\cup(-1,\infty)$ B. $(-\infty,-3)\cup(2,\infty)$ C. $(-4,-3)\cup(-1,2)$
D. $(-4,-3)\cup(-1,\infty)$ E. NOTA

21. Find the next term in the sequence: $3,\frac{3}{5},\frac{1}{3},\frac{3}{13},\frac{3}{17},\frac{1}{7},\ldots$

A. $\frac{1}{5}$ B. $\frac{1}{11}$ C. $\frac{3}{25}$ D. $\frac{3}{29}$ E. NOTA

22. Simplify: $\left(\left(\sqrt[6]{a}\right)^{3/2}\right)^4\cdot\left(\sqrt[4]{a}\right)^{-2}$ for $a>0$

A. a^{-8} B. $a^{1/2}$ C. a^1 D. a^{36} E. NOTA

23. Which of the following is NOT in the solution set to the system: $\begin{matrix}3x+1\geq y\\4y-x<2\end{matrix}$.

A. (-2,-5) B. (0,-1) C. (1,0) D. (9,1) E. NOTA

24. Let $f(x)=\frac{x+1}{x-6}$. Find the y-intercept of $f^{-1}(x)$.

A. -6 B. -1 C. 1 D. 6 E. NOTA

25. Find the diameter: $(x-4)^2+(y+9)^2=7$.

A. 4 B. 7 C. 8 D. 14 E. NOTA

26. Let p and q be the solutions to the equation $0=x^2-9x+3$. Find $\frac{p+q}{2}$.

A. $\frac{2}{9}$ B. $\frac{9}{2}$ C. 9 D. No Sol'ns E. NOTA

27. Let $f(x)=\sqrt{3x-7}$. Find the domain of $f^{-1}(x)$.

A. $(-\infty, 7/3]$ B. $[7/3, \infty)$ C. $[0,\infty)$ D. $(-\infty,\infty)$ E. NOTA

28. Find the sum of the real solutions: $\sqrt{2x-2}-\sqrt{x+6}=1$.

A. 3 B. 19 C. 22 D. 25 E. NOTA

29. Train A starts a round trip journey from Town A to Town B at 10:00am. At the same time, Train B starts a round trip journey from Town B to Town A. The two trains travel along straight, parallel tracks between the towns. Each train travels at a constant speed, but one travels faster than the other. They pass each other at a point 360 miles from Town A. After reaching their respective destinations, the trains immediately return to their originating towns. On the return trips, after the two trains have reached the opposite towns, they meet at a point 200 miles from Town B. How many miles apart are Town A and Town B?

A. 520 B. 560 C. 880 D. 2640 E. NOTA

30. Container A holds x gallons of milk. Container B holds x gallons of water. Y ounces of milk are removed from Container A and put in Container B. The new contents of Container B are mixed thoroughly until there is a uniform consistency. Y ounces of the mixture are removed from Container B and added to Container A. Which of the following statements is true (for Y ounces $< x$ gallons)?

A. Container A has more milk than Container B has water
B. Container B has more water than Container A has milk
C. The amount of water in Container A is the same as the amount of milk in Container B
D. Not Enough Information
E. NOTA

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Question #1

$\log_A 25 = \frac{1}{2}$

$0 = -\sqrt{B+5} + 3$

$3C - 2D + 2 = 0$

$C + 3D = 14$

Find $A + B + C + D$.

Question #2

Let $i = \sqrt{-1}$.

$(5 + 2i) + (7i - 3) = A + Bi$

$(3i + 4)(-2 + i) = C + Di$

$\frac{5 + 7i}{1 - i} = E + Fi$

Find $A + B + C + D + E + F$.

Question #3

How many of the following relations are functions?

1. {(5,2) , (12,31) , (-7,-4) , (0.5,4) , (6,7) , (2,3)}
2. {(5,2) , (12,2) , (-7,2) , (0.5,2) , (6,2) , (2,2)}
3. $3x + 0y = 225$
4. $-\sqrt{x+5} + y = 3$
5. $6x + y = -2$
6. $x^2 + y = 15$
7. $3x^2 - 5y^2 = 4.5$
8. $|7x - y| = 9$
9. $8^x + y = 4.5$
10. $0.5x - y^2 = 6.8$
11. $x - y^3 = 0$
12. $x^2 + y \le 3$

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Question #4

Let A be the slope of $x = \frac{2}{3}y - 1$

Let B be the distance from $y = \frac{1}{17}x - 5$ to the point (51,-2)

Let C be the x-intercept of $y = 2x - 5$

Let D be the y-intercept of $7x - 2y = 4$

Find $A + B + C + D$.

Question #5

Find the distance between the centers of the graphs of:

$x^2 - 4y^2 - 2x - 24y - 39 = 0$ and $x^2 + 9y^2 + 2x - 18y + 1 = 0$

Question #6

$x^{3/5} = 16$

$\log_{\sqrt{2}} 16 = z$

$2^{y} - 1 = 2^{y-1}$

Find $x + y + z$.

Question #7

A group of friends went to a restaurant for lunch. They had agreed to split the bill equally. However, when the bill arrived two of them discovered that they had left their money at home. The others in the group then agreed to make up the difference, which resulted in each one having to pay an extra $1.30. If the total bill was $78.00, how many people were in the group?

Question #8

$f(x) = 6x^7 - 5x^4 - 21x^3 + kx - 12$, where $k > 0$.

A = degree of $f(x)$
B = leading coefficient of $f(x)$
C = y-intercept of $f(x)$
D = max number of possible positive x-intercepts of $f(x)$
E = number of complex roots of $f(x)$

Find $A + B + C + D + E$.

Question #9

How many of the following statements are true for all real numbers a, b, c?

$|a+b| = |a| + |b|$ If $|a| = |b|$, then $a = b$.

$a|b+c| = |ab+ac|$ If $|a-b| = 0$, then $a = b$.

$\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$

Question #10

When 22 is divided by 3, the remainder is two less then the divisor. Find the smallest natural number such that when it is divided by 2, 3, 4, ..., 8 its remainder will always be 2 less than its divisor.

Question #11

List all integers in the domain of the function $f(x) = \sqrt{\sqrt{x} - x}$.

Question #12

Let A = the slope of the line perpendicular to the line that goes through (-3,-4) and (6,-5).

Let $9x^2 + Bx + C = 0$, the quadratic equation, with solutions $x = \frac{1}{3}(4 \pm 2\sqrt{3})$.

Let D = the zero of $3x + 4y = -6$.

Let $x^3 + Ex^2 + 6x + 4 = 0$ where $x = -2$ is a solution.

Find $A + B + C + D + E$.

Question #13

There is a linear relationship between degrees Celsius and degrees Fahrenheit. 100°C = 212°F and 0°C = 32°F. Find integer, X, such that X°C = X°F.

Question #14

A publisher ships a total of 300-450 books to warehouses A and B. At least 1/3 of the books must go to each of the warehouses. If the cost for shipping a book to warehouse A is \$0.37 and the cost for shipping a book to warehouse B is \$0.55, how many dollars is the minimum shipping cost?

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Question #15

In each line below, the second equation has roots which are reciprocals of the first. Each equation has integer coefficients that are relatively prime and the leading coefficient is positive.

$x^2 - 3x - 18 = 0$; $Ax^2 + Bx + C = 0$

$2x^2 - 13x + 15 = 0$; $Dx^2 + Ex + F = 0$

$x^2 - x + 1 = 0$; $Gx^2 + Hx + I = 0$

$Cx^2 + Ex + G = 0$; $Rx^2 + Sx + T = 0$

Find $R + S + T$.

Answers

Individual

1. B
2. A
3. D
4. B
5. C
6. D
7. D
8. B
9. D
10. A
11. C
12. D
13. B
14. D
15. D
16. B
17. D
18. B
19. B
20. C
21. C
22. B
23. E
24. B
25. E
26. B
27. C
28. B
29. C
30. C

Team

1. 635
2. 3
3. 7
4. 2
5. $2\sqrt{5}$
6. 73
7. 12
8. 11
9. 1
10. 838
11. {0,1} or 0 and 1
12. -9
13. -40
14. 129
15. -11

Indiv. Solutions

1. Subtract eq 1 from eq 2 to get $-3y = -3 \Rightarrow y = 1$
B. 1

2. $(7i-4)(3i+2) \Rightarrow 21i^2 - 12i + 14i - 8 \Rightarrow -21 + 2i - 8 \Rightarrow 2i - 29 \Rightarrow 2 + -29 = -27$
A. -27

3. Find y-int by plugging in 0 for x. Y = 5. Find x-int by plugging in 0 for y. X = 5/3. Y + X = 15/3 + 5/3 = 20/3
D. 20/3

4 In 1986 $cb + bs = 97 \Rightarrow cb = 97 - bs$. In 1972 $cb - 14 = 2(bs - 14)$
$\Rightarrow (97 - bs) - 14 = 2bs - 28 \Rightarrow 111 = 3bs \Rightarrow bs = 37 \Rightarrow cb = 60 \Rightarrow 60 - 37 = 23$
B. 23

5. The conic is a vertical ellipse. Foci located on the vertical axis. Center (-2,8). A = 5, B = 4, C = 3 (Pythagorean triplet). Foci (-2,8+3) and (-2,8-3).
C. (-2,11)

6. Factor the trinomial $(2a - 5b)^2 = 0 \Rightarrow 2a - 5b = 0 \Rightarrow 2a = 5b \Rightarrow a/b = 5/2$.
D. 5/2

7. Use formulae $y = 1(1+r)^1, y = 1(e)^{(.12)(1)} \Rightarrow 1(1+r)^1 = 1(e)^{(.12)(1)} \Rightarrow (1+r) = (e)^{(.12)}$
$\Rightarrow r = (e)^{(.12)} - 1 = 0.1274968 \Rightarrow 12.75\%$
D. 12.75%

8. In a polynomial, the constant term is the y-int.
B. 5

9. $1/20\,(3) + 1/20\,(8) + 1/\text{x}\,(8) = 1 \Rightarrow 3/20 + 8/20 + 8/x = 20/20$
$\Rightarrow 11/20 + 8/x = 20/20 \Rightarrow 8/x = 9/20 \Rightarrow x = 160/9 = 17 and 7/9$
D. 17 7/9

10. $x^2 \log_{10} 8 - x \log_{10} 5 = 2(\log_2 10)^{-1} - x \Rightarrow (\log 2)(3x^2) - (\log 5)(x) + x = 2(\log 2)$
$\Rightarrow (\log 2)(3x^2) - (\log 5)(x) + (\log 10)x - 2(\log 2) = 0$
$\Rightarrow (\log 2)(3x^2) + (\log 10 - \log 5)(x) - 2(\log 2) = (\log 2)(3x^2) + (\log 2)(x) - (\log 2)(2)$
$\Rightarrow (\log 2)[3x^2 + x - 2] = 0 \Rightarrow 3x^2 + x - 2 = 0 = (3x-2)(x+1) \Rightarrow x = 2/3, x = -1$
$\Rightarrow 2/3 + -3/3 = -1/3$
A. -1/3

11. (6)(5)-(1)(3)=27
C. 27

12. $(1-i)^9 = (1-i)^8(1-i) = ((1-i)^2)^4(1-i) = ((-2i))^4(1-i) = (16)(1-i) = 16 - 16i$
D. 16-16i

13. $\log_7(3^{x+1}) = (x+1)(\log_7 3) = (x)(\log_7 3) + (\log_7 3) = 2x$
$\Rightarrow (x)(\log_7 3) - 2x = -\log_7 3 \Rightarrow (\log_7(3) - 2)x = -\log_7 3$
$\Rightarrow x = (-\log_7 3)/(\log_7(3) - 2) = 0.3933156 = x$
B. 3

14. $2y = 7x - 2 \Rightarrow m = 7/2$
D. 7/2

15. $y^2 = -x + 1 \Rightarrow 9x^2 + 9(-x+1) = 1 \Rightarrow 9x^2 - 9x + 8 = 0$ check the discriminant
$\Rightarrow [(-9)^2 - (4)(9)(8)] < 0$ no solution
D. No Solutions

16. Conic is a horizontal hyperbola with center (1,-2). A = 2, so vertices are (-1,-2) and (3,-2). So domain = $(-\infty,-1] \cup [3,\infty)$
B. $(-\infty,-1] \cup [3,\infty)$

17. Factor the numerator $x^2+6x-55=(x+11)(x-5)$. (x-5) in the numerator and (x-5) in denominator divide out. So no vertical exists.
D. none

18. If x is positive or negative, then (x)(x) is positive. If x = 0, then (x)(x) = 0. 0 is not positive.
B. sometimes

19. Check the discriminant: $b^2-4(3)(2)=b^2-24$. When $b \geq \sqrt{24}$ there are x-int(s). When $b < \sqrt{24}$ there are no x-ints
B. sometimes

20. Use number line to check for positive or negative intervals. Use critical points to establish intervals. Factoring numerator yields zeros x = 2 and x = -3. Factoring denominator yields vert asymptotes x = -1 and x = -4. Substituting x = -10 in the inequality yields a positive #. Substituting x = -3.5 in the inequality yields a negative #. Substituting x = -2 in the inequality yields a positive #. Substituting x = 0 in the inequality yields a negative #. Substituting x =5 in the inequality yields a positive #. The expression is negative in the intervals (-4,-3) U (-1,2)
C. (-4,-3) U (-1,2)

21. 3/1, 3/5, 3/9, 3/13, 3/17, 3/21, 3/25 (denominator incremented by 4)
C. 3/25

22. $\left(\left(\sqrt[6]{a}\right)^{3/2}\right)^4 \cdot \left(\sqrt[4]{a}\right)^{-2} = \left(\left(a^{1/6}\right)^{3/2}\right)^4 \cdot \left(a^{1/4}\right)^{-2} = a^{1\cdot 3\cdot 4/6\cdot 2} \cdot a^{-2/4} = a^1 \cdot a^{-1/2} = a^{1+-1/2} = a^{1/2}$
B. $a^{1/2}$

23. plug in each of the choices. All work. NOTA.
E. NOTA

24. y-int of inverse = x-int of original function. f(-1)=0, so y-int is -1
B. -1

25. 7 is the radius squared. The radius is sqrt(7). Diameter is 2*sqrt(7).
E. NOTA

26. Average (arith mean) of the two x-ints is the x coordinate of the vertex = -b/2a = -(-9)/((2)(1) = 9/2
B. 9/2

27. The domain of the inverse is the same as the range of the original function. [0, infinity)
C. [0,infinity)

28. $\sqrt{2x-2}-\sqrt{x+6}=1 \Rightarrow \sqrt{2x-2}=\sqrt{x+6}+1$. Square both sides.
$2x-2=2\sqrt{x+6}+1+x+6 \Rightarrow x-9=2\sqrt{x+6}$. Square both sides.
$\Rightarrow x^2-18x+81=4(x+6)=4x+24 \Rightarrow x^2-22x+57=(x-3)(x-19)=0$. x = 3 or x = 19. Plugging in shows 3 is an extraneous solution.
B. 19

29. The two trains have covered one full width at the 1st meeting. Train A has traveled 360 miles. At the 2nd meeting, they have covered 3 widths. At that time Train A has traveled 3 x 360 miles or 1080. At the 2nd meeting, Train A is 200 miles from Town B. 1080 – 200 = 880.
C. 880

30. After Y milk are transferred, A has (x-Y) pure milk and B has (x+Y) mix [(Y/(x+Y)) milk and (x/(x+Y)) water]. After Y mix are transferred, A has x mix [(Y*x/(x+Y)) water and {(x-Y) + Y*Y/(x+Y)} milk] and B has x mix [(x*Y/(x+Y) milk and x*x/(x+Y) water]. Simplifying gives A [x*Y/(x+Y) water and x*x/(x+Y milk)] and B [x*Y/(x+Y) milk and x*x/(x+Y)water]. The same amount. Simplest case, let x = 2 gal and let Y = 1 gal....
C. Same

Plain Answers

1. **635**

$\log_A 25 = \frac{1}{2} \Rightarrow A^{\frac{1}{2}} = 25 \Rightarrow A = 25^2 = 625$

$0 = -\sqrt{B+5}+3 \Rightarrow \sqrt{B+5} = 3 \Rightarrow B+5 = 9 \Rightarrow B = 4$

$3C-2D+2 = 0 \;\&\; C+3D = 14 \Rightarrow 3C-2D+2 = 0 \;\&\; -3C-9D = -42$

$-11D = -44 \Rightarrow D = 4 \;\&\; C = 2$

$A+B+C+D = 625+4+4+2 = 635$

2. **3**

$(5+2i)+(7i-3) = (2+9i) = A+Bi$

$(3i+4)(-2+i) = (-6i-8+3i^2+4i) = (-11-2i) = C+Di$

$\frac{5+7i}{1-i}\cdot\frac{1+i}{1+i} = \frac{5+7i+5i-7}{1-i^2} = \frac{-2+12i}{1+1} = -1+6i = E+Fi$

$A+B+C+D+E+F = 2+9-11-2-1+6 = 3$

3. **7**

1. YES – no repeated x's
2. YES – no repeated x's
3. NO – vertical line
4. YES – square root function
5. YES – linear function
6. YES – quadratic function
7. NO – hyperbola
8. NO – (0,9) and (0,-9)
9. YES – power function
10. NO – (15.6,-1) and (15.6,1)
11. YES – inverse of basic cubic function
12. NO – (0,-5) and (0,-6)

4. **2**

A = $\frac{3}{2}$ slope of $x = \frac{2}{3}y - 1$ C = $\frac{5}{2}$ x-intercept of $y = 2x - 5$

B = 0 since the point is on the line D = -2 y-intercept of $7x - 2y = 4$

$A+B+C+D = \frac{3}{2}+0+\frac{5}{2}+-2 = 2$

5. **2sqrt(5)**

$0 = x^2-2x-4y^2-24y-39 = (x^2-2x+1)-4(y^2+6y+9)-39-1+36 = (x-1)^2-4(y+3)^2-4$

$0 = x^2+2x+9y^2-18y+1 = (x^2+2x+1)+9(y^2-2y+1)+1-1-9 = (x+1)^2+9(y-1)^2-9$ the centers are (1,-3) and (-1,1), dist is $2\sqrt{5}$

6. **73**

$x^{3/3} = 16 \Rightarrow x = 16^{3/2} = 64; \log_{\sqrt{2}} 16 = z = \frac{\log 2^4}{\log 2^{1/2}} = \frac{4}{1/2} = 8$

$2^y - 1 = 2^{y-1} = 2^{-1}\cdot 2^y \Rightarrow 2^y - (1/2\cdot 2^y) = 1 = 1/2\cdot 2^y \Rightarrow 2^y = 2 \Rightarrow y = 1$

$x+y+z = 64+8+1 = 73$

7. **12**

$\frac{78}{x}+1.30 = \frac{78}{x-2}$ plug into graphing calculator to find x = 12

8. **11**

$f(x) = 6x^7-5x^4-21x^3+kx-12$

A = 7 degree of $f(x)$
B = 6 leading coefficient of $f(x)$
C = -12 y-intercept of $f(x)$
D = 3 max number of possible positive x-intercepts of $f(x)$
E = 7 number of complex roots of $f(x)$

$A+B+C+D+E = 7+6+-12+3+7 = 11$

9. **1**

How many of the following statements are true for all real numbers a, b, c? 1

$|a+b|=|a|+|b|$ counter example a = -1, b = 1

If $|a|=|b|$, then $a = b$ counter example a = -1, b = 1

$a|b+c|=|ab+ac|$ counter example a = -1

If $|a-b|=0$, then $a = b$ $|a-b|=0 \Rightarrow a-b=0 \Rightarrow a=b$

$\left|\frac{a}{b}\right|=\frac{|a|}{|b|}$ undefined for b = 0

10. **838**

n = #, d = divisor, q = quotient, r = remainder = d-2

$n = d\cdot q + d - 2 \Rightarrow n+2 = d(q+1) \Rightarrow$ d is a factor of n + 2

to find the smallest $n+2 = 2\cdot 3\cdot 2\cdot 5\cdot 7\cdot 2 = 840 \Rightarrow n = 838$

11. **{0,1}**

$\sqrt{x} \Rightarrow x \geq 0$; $f(x)=\sqrt{\sqrt{x}-x} \Rightarrow \sqrt{x}-x \geq 0 \Rightarrow \sqrt{x} \geq x \Rightarrow x \geq x^2 \Rightarrow x \in [0,1]$ {0,1}

12. **-9**

slope $= \frac{-4+5}{-3-6} = \frac{-1}{9}$ perpendicular slope = 9 = A

$(x-{}^{4+2\sqrt{3}}/_{3})(x-{}^{4-2\sqrt{3}}/_{3}) = x^2+({}^{-8}/_{3})x+{}^{16-12}/_{9} = 0 = x^2+({}^{-8}/_{3})x+{}^{4}/_{9} \Rightarrow 9x^2+(-24)x+4$

B = -24 and $C = 4$

D = -2 the zero of $3x+4y=-6$.

synthetic division -2 into 1 E 6 4 gives a result of $-16+4E=0 \Rightarrow E=4$

$A+B+C+D+E = 9+-24+4+-2+4 = -9$

13. **-40**

$(^\circ C, ^\circ F) \Rightarrow (100^\circ, 212^\circ) and (0^\circ, 32^\circ) \Rightarrow F = \frac{9}{5}C + 32$

$(X, X) \Rightarrow X = \frac{9}{5}X + 32 \Rightarrow X - \frac{9}{5}X = -32 \Rightarrow \frac{-4}{5}X = -32 \Rightarrow X = -40$

14. **129**

let x = # books going to warehouse A; y = # books going to warehouse B

translate problem into inequalities: $300 \leq x+y \leq 450$; $x \leq 2y$; $y \leq 2x$

solving the system gives points: (300,150), (150,300), (100,200), (200,100)

substituting points into $.37x+.55y=C$ shows that (200,100) gives the lowest cost 129

15. **-11**

general solution: let p and q be the solutions to a quadratic with reciprocals 1/p and 1/q

$(x-p)(x-q) = x^2+(-p-q)x+pq = 0$

$(x-{}^{1}/_{p})(x-{}^{1}/_{q}) = x^2+(-{}^{1}/_{p}-{}^{1}/_{q})x+{}^{1}/_{pq} = 0 = x^2+({}^{-q-p}/_{pq})x+{}^{1}/_{pq} \Rightarrow pqx^2+(-p-q)x+1$

$x^2-3x-18=0 \Rightarrow -18x^2-3x+1=0$

$2x^2-13x+15=0 \Rightarrow 15x^2-13x+2=0$

$x^2-x+1=0 \Rightarrow 1x^2-1x+1=0$

$1x^2-13x+1=0 \Rightarrow 1x^2-13x+1=0$

$R+S+T = 1-13+1 = -11$.