#8 15

Algebra II Team Answers: January Regional

Leto '99

1. -39
2. 3
3. 11.3 (or $11\frac{3}{10}$ or $\frac{113}{10}$)
4. 18
5. $\frac{4}{21}$ (question specified "fraction form")
6. $\frac{2\sqrt{5}+1}{19}$ (or $\frac{2\sqrt{5}}{19}+\frac{1}{19}$)
7. 16
8. 29
9. 2
10. 189.51 (question specified "hundredths place")
11. 57
12. 13
13. 6.25 (or $6\frac{1}{4}$ or $\frac{25}{4}$)
14. \$273 (dollar sign not necessary)
15. 97.9 (or $\frac{979}{10}$ or $97\frac{9}{10}$)

Answers/Solutions: Algebra II, Team Questions. January Regional

1. $x=-16,\ yz = 3^{\frac{4}{3}}\cdot 3^{\frac{1}{3}} = 3^{\frac{5}{3}} = 3\sqrt[3]{9}$ so $xyz = -48\sqrt[3]{9}$. Therefore a+b=(-48)+9=−39

2. $k=\frac{1}{2}$ for $f(x)$ and for f(x-1), the x-intercept is $\frac{3}{2}$. $\frac{1}{2}c=\frac{3}{2}$ when <u>c = 3</u>.

3. [8(k+1) + -30 + 216] - [-32 + 90 + 18(k+1)] = 5. The value of k = <u>11.3</u>

4. Multiplying the equation by the common denominator: $(x+2)(x+3)+2(x)(x+3)=5x(x+2)$
$x^2+5x+6+2x^2+6x=5x^2+10x$ and $2x^2-1x-6=0$. Adding 18 to both sides of the equation, $2x^2-1x+12=18$. The answer is <u>18.</u>

5. The sum of the roots of the function is $\frac{-b}{a}$. So the sum of the roots is 61/4. Subtracting 11, the sum of the remaining roots is 4.25 =k. K+1=5.25 and the reciprocal of $5\frac{1}{4}$ is $\frac{4}{21}$.

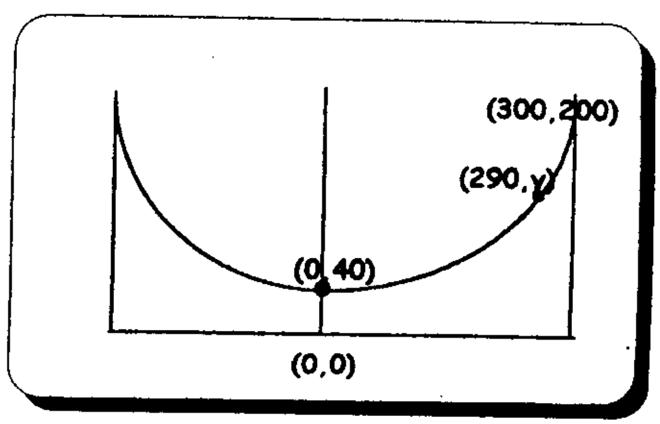
6. $6^x\cdot 7^x = c^2$ so (4)(5)= c^2. $c=\sqrt{20}=2\sqrt{5}$. $\frac{1}{2\sqrt{5}-1}=\frac{2\sqrt{5}+1}{19}$ (use the conjugate)

7. $\log_3 m = 16$ so $3^{16}=m$. Using the sequential counting principle, m can have a factor of $3^0, 3^1, \ldots, 3^{16}$ or 17 factors. So A=17. In the second equation, x=1 so y=0 and $(2x)^0=1$ so B=1 and A-B= 17-1 = <u>16</u>.

8. $\frac{200+x}{254+x}=0.795$ and x= 9.41 so P=10 games. Note that at 9 games, the computer will compute the percentage at less than 80%. For the second question, $\frac{200+0.90x}{254+x}=0.795$ and for that equation, x=18.38 and Q=19. P+Q = <u>29</u>.

9. $\frac{A}{x+3}+\frac{B}{x+4}=\frac{1}{(x+3)(x+4)}$ gives $Ax+4A+Bx+3B=1$ (obtaining a common denominator and setting numerators equal). So A+B = 0 (the coefficients of the x term) and 4A+3B=1 (the constants). Solving, we get A=1 and B= -1, so A-B = <u>2</u>.

10. $y-40=a(x-0)^2$
$200-40=a(300)^2$ from the point (300,200).
a= $\frac{2}{1125}$. Using the point (290, y) to find the point 10 feet away from the support pole, we get y=<u>189.51</u>



11. $f(2) = f(-2) = 3$ and $g(5) = 8$ so $g(-5) = -8$. (These are by the definitions of even and odd functions.) $3^2 - 2(3)(-8) = 9 + 48 = 57$.

12. $\log(3 \cdot 10) = \log 10 + \log 3 = 1 + y$. $\log(4 \cdot 27) = \log(9k)$ so k= 12, and B=12.
$C = \frac{\log 3}{\log 2} \cdot \frac{\log 2}{\log 10} = y$. A+B-C = 1 + y + 12 - y = 13.

13. The vertex of the parabola is midpoint between the line x=5 and the focus (7, -1) which gives the equation $\frac{1}{4}(y+1)^2 = x - 6$. The $\frac{1}{4}$ is determined by setting the distance from Focus to Vertex (1) equal to $\frac{1}{4a}$. At y=0, the x coordinate is 6.25.

14. $120 + 5D = 180 + 3D$ gives the "breakeven point" of 30 days. At day 31, when heater B will cost less than heater A, the cost of heater B will be $273.

15. $f^{-1}(x) = \frac{x-6}{2}$ and $f^{-1}(2) = -2$. $(f(2))^{-1} = \frac{1}{10}$ and g(f(2))=g(10)=100.
$-2 - \frac{1}{10} + 100 = 97.9$