

# Gaither-Leto Algebra I Bowl Solutions 2/19/94

1. 256

2.  $2(x+y)^2 + (x-y)^2 = 2x^2 + 4xy + 2y^2 + x^2 - 2xy + y^2 = 3x^2 + 3y^2 + 2xy = 3(x^2 + y^2) + 2xy = 3(34) + 2(\frac{21}{2}) = 121$

3.  $\frac{2a^3}{5b^9} \quad b=4$  since  $5b^9$  is divisible by 4.  $\therefore a=2 \quad a+4=6$

4.  $[(x^2-5x-1)-5][(x^2-5x-1)+5] = (x^2-5x-6)(x^2-5x+4) = (x-6)(x+1)(x-4)(x-1) = 6 \cdot (-1)(4)(1) = -24$

5.  $A = \frac{(x+7)(x-5)}{(x-5)(x+2)} = \frac{(x+7)}{(x+2)}$   $B = \frac{x}{x-3} \cdot \frac{-1(x-3)}{2(x+2)} = \frac{-1}{2(x+2)}$

$C = \frac{5(x-7)}{(x-7)(x+7)} + \frac{7(x-7)}{(x-7)(x+7)} = \frac{12(x-7)}{(x-7)(x+7)} = \frac{12}{x+7}$   $\frac{A \cdot C}{B} = \frac{(x+7)}{(x+2)} \cdot \frac{12}{(x+7)} \cdot \frac{(x+2)}{-1} = -12$

6.  $x^2 + (x+1)^2 + (x+2)^2 + (x+3)^2 = 534 \Rightarrow 4x^2 + 12x + 14 = 534 \quad 4x^2 + 12x - 520 = 0$

$4(x^2 + 3x - 130) = 0 \quad 4(x+13)(x-10) = 0 \quad x=10 \quad \text{JAMES AGE} = 13$

$L \cdot W = 96 \quad L(L-4) = 96 \quad (L-12)(L+8) = 0$

$W = L-4 \quad L^2 - 4L - 96 = 0$

$L = 12$

$B = 12$

$A - B = 1$

7.  $r^3 = 4r^2 + 4r + 3r^2 + 4r \quad r^3 - 7r^2 - 8r = 0 \quad r(r-8)(r+1) = 0$   
 $r^3 = 7r^2 + 8r \quad r(r^2 - 7r - 8) = 0 \quad r=8$

8. Let  $z = x-1 \quad \therefore r^4 + 4r^3 + 6r^2 + 4r + 1 = (r+1)^4 \quad (x-1+1)^4 = x^4$

9.  $\frac{4}{x+3} + \frac{4}{x-3} = 1 \quad 4(x-3) + 4(x+3) = x^2 - 9 \quad 4x - 12 + 4x + 12 = x^2 - 9$

$0 = x^2 - 8x - 9 \quad (x-9)(x+1) \quad x=9 \quad \text{downstream } 12 \quad \text{upstream } 6 \quad \text{ratio } 2:1$

10.  $x$  sheets  $x-50$  envelopes  $\frac{2}{3}$  sheets  $\frac{2}{3}x + 50$  envelopes  
 $x-50 = \frac{2}{3}x + 50 \quad 3x - 150 = 2x + 150 \quad 2x = 300 \quad (150, 100)$   
 $-32x - 2 < 3 \quad x - 120 \quad 2x \leq 2 \quad x = 150 \quad \text{envelopes } 100$

11.  $-1 < x < 5 \quad x \geq 1 \quad x \leq 1 \quad \text{interaction } x=1$

12.  $A = 2 + (-3) = -1 \quad B = 3/2 \quad C = \sqrt{8^2 + 6^2} = \sqrt{100} = 10 \quad ABC = -15$

13.  $LW = (L + 5/2)(W - 2/3) \quad LW = LW - 2/3L + 5/2W - 5/3$   
 $LW = (L - 5/2)(W + 4/3) \quad LW = LW + 4/3L - 5/2W - 10/3$   
 $0 = -2/3L + 5/2W - 5/3$   
 $0 = 4/3L - 5/2W - 10/3$   
 $0 = 2/3L - 15/3 \quad 5 = 2/3L \quad L = 15/2$   
 $0 = 4/3(15/2) - 5/2W - 10/3$   
 $0 = 30/3 - 10/3 - 5/2W \quad 20/3 = 5/2W \quad \frac{2}{5}W = 8/3 \quad W = 8/3$

Area =  $\frac{15}{2} \cdot \frac{8}{3} = 20$

14.  $\frac{720}{r} = \frac{660}{r+15} + 6 \quad 720(r+15) = 660r + 6r(r+15) \quad 720r + 10800 = 660r + 6r^2 + 90r$   
 $6r^2 + 300r - 10800 = 0 \quad 6(r^2 + 50r - 1800) = 0 \quad 6(r+45)(r-40) = 0$   
 $r = 40 \quad r + 15 = 55 \quad 95$

15.  $A = -7L - 5x - 2 < 13 \quad -5L - 5x < 15 \quad 17x > -3$

$B = -6 \leq 2x - 7 \leq 6 \quad 1 \leq 2x \leq 13 \quad 1/2 \leq x \leq 13/2$

$C = 6x + 275 \text{ or } 6x + 2 \leq -5 \quad 6x > 3 \text{ or } 6x \leq -7 \quad x > 1/2 \text{ or } x \leq -7/6$

$A \cap B \cap C = \{ 1/2 \leq x < 13 \}$