

Pre-Calculus Math II

page 230 #7-10 (at least 3 of each), 11, 13, 14, 17

7. a) $(x+3)(x+4)=0$
 $x+3=0$ or $x+4=0$
 $x=-3$ $x=-4$

b) $(x-2)(x+\frac{1}{2})=0$
 $x-2=0$ or $x+\frac{1}{2}=0$
 $x=2$ $x=-\frac{1}{2}$

c) $(x+7)(x-8)=0$
 $x+7=0$ or $x-8=0$
 $x=-7$ $x=8$

d) $x(x+5)=0$
 $x=0$ or $x+5=0$
 $x=-5$

done

e) $(3x+1)(5x-4)=0$
 $3x+1=0$ or $5x-4=0$
 $3x=-1$ $5x=4$
 $x=-\frac{1}{3}$ $x=\frac{4}{5}$

f) $2(x-4)(7-2x)=0$
 $x-4=0$ or $7-2x=0$
 $x=4$ $7=2x$
 $\frac{7}{2}=x$

not relevant to zeros

8. a) $10n^2-40=0$
 $10(n^2-4)=0$
 $10(n-2)(n+2)=0$
 $n-2=0$ or $n+2=0$
 $n=2$ $n=-2$

not relevant to the zeros

b) $\frac{1}{4}x^2 + \frac{5}{4}x + 1 = 0$
 $4 \cdot \frac{1}{4}x^2 + 4 \cdot \frac{5}{4}x + 4 \cdot 1 = 4 \cdot 0$
 $x^2 + 5x + 4 = 0$
 $(x+1)(x+4) = 0$
 $x+1=0$ or $x+4=0$
 $x=-1$ $x=-4$

multiply all terms by the common denominator

mult=27
add=28

c) $3w^2+28w+9=0$
 $3w^2+27w+w+9=0$
 $3w(w+9)+1(w+9)=0$
 $(w+9)(3w+1)=0$
 $w+9=0$ or $3w+1=0$
 $w=-9$ $3w=-1$
 $w=-\frac{1}{3}$

d) $8y^2-22y+15=0$
 $8y^2-12y-10y+15=0$
 $4y(2y-3)-5(2y-3)=0$
 $(2y-3)(4y-5)=0$
 $2y-3=0$ or $4y-5=0$
 $2y=3$ $4y=5$
 $y=\frac{3}{2}$ $y=\frac{5}{4}$

*mult=120
add=-22
120=2*2*2*3*5
rearrange prime factors to get -10 & -12*

page 230 cont.

8.

e) $d^2 + \frac{5}{2}d + \frac{3}{2} = 0$

$2 \cdot d^2 + 2 \cdot \frac{5}{2}d + 2 \cdot \frac{3}{2} = 2 \cdot 0$

$2d^2 + 5d + 3 = 0$
 $2d^2 + 2d + 3d + 3 = 0$
 $2d(d+1) + 3(d+1) = 0$
 $(d+1)(2d+3) = 0$
 $d+1 = 0$ or $2d+3 = 0$
 $d = -1$ $2d = -3$
 $d = -\frac{3}{2}$

multiply all terms by common denominator

f)

$4x^2 - 12x + 9 = 0$
 $4x^2 - 6x - 6x + 9 = 0$
 $2x(2x-3) - 3(2x-3) = 0$
 $(2x-3)(2x-3) = 0$
 $2x-3 = 0$
 $2x = 3$
 $x = \frac{3}{2}$

9. a)

$k^2 - 5k = 0$
 $k(k-5) = 0$
 $k = 0$ or $k-5 = 0$
 $k = 5$

b)

$9x^2 = x + 8$
 $9x^2 - x - 8 = 0$
 $9x^2 - 9x + 8x - 8 = 0$
 $9x(x-1) + 8(x-1) = 0$
 $(x-1)(9x+8) = 0$
 $x-1 = 0$ or $9x+8 = 0$
 $x = 1$ $9x = -8$
 $x = -\frac{8}{9}$

move the $-\frac{1}{3}t^2$ to the other side so it becomes positive - it's easier to factor with a positive quadratic term

c)

$\frac{8}{3}t + 5 = -\frac{1}{3}t^2$
 $\frac{1}{3}t^2 + \frac{8}{3}t + 5 = 0$
 $3 \cdot \frac{1}{3}t^2 + 3 \cdot \frac{8}{3}t + 3 \cdot 5 = 3 \cdot 0$
 $t^2 + 8t + 15 = 0$
 $(t+3)(t+5) = 0$
 $t+3 = 0$ or $t+5 = 0$
 $t = -3$ $t = -5$

d)

$\frac{25}{49}y^2 - 9 = 0$
 $(\frac{5}{7}y - 3)(\frac{5}{7}y + 3) = 0$
 $\frac{5}{7}y - 3 = 0$ or $\frac{5}{7}y + 3 = 0$
 $7 \cdot \frac{5}{7}y = 3 \cdot 7$ $7 \cdot \frac{5}{7}y = -3 \cdot 7$
 $5y = 21$ $5y = -21$
 $y = \frac{21}{5}$ $y = -\frac{21}{5}$

Page 230 cont.

9.

$$\begin{aligned}
 e) \quad 2s^2 - 4s &= 70 \\
 2s^2 - 4s - 70 &= 0 \\
 2s^2 - 14s + 10s - 70 &= 0 \\
 2s(s-7) + 10(s-7) &= 0 \\
 (s-7)(2s+10) &= 0 \\
 s-7=0 \quad \text{or} \quad 2s+10=0 \\
 s=7 \quad \quad \quad 2s &= -10 \\
 \quad \quad \quad \quad \quad s &= -5
 \end{aligned}$$

$$\begin{aligned}
 f) \quad 4q^2 - 28q &= -49 \\
 4q^2 - 28q + 49 &= 0 \\
 4q^2 - 14q - 14q + 49 &= 0 \\
 2q(2q-7) - 7(2q-7) &= 0 \\
 (2q-7)(2q-7) &= 0 \\
 2q-7=0 \\
 2q &= 7 \\
 q &= \frac{7}{2}
 \end{aligned}$$

$2 \cdot 2 \cdot 5 \cdot 7$
 $10 \cdot 14$

$$\begin{aligned}
 10. \quad a) \quad 42 &= x^2 - x \\
 0 &= x^2 - x - 42 \\
 0 &= (x-7)(x+6) \\
 x-7=0 \quad \text{or} \quad x+6 &= 0 \\
 x=7 \quad \quad \quad x &= -6
 \end{aligned}$$

$$\begin{aligned}
 b) \quad g^2 &= 30 - 7g \\
 g^2 + 7g - 30 &= 0 \\
 (g+10)(g-3) &= 0 \\
 g+10=0 \quad \text{or} \quad g-3 &= 0 \\
 g &= -10 \quad \quad \quad g = 3
 \end{aligned}$$

$$\begin{aligned}
 c) \quad y^2 + 4y &= 21 \\
 y^2 + 4y - 21 &= 0 \\
 (y+7)(y-3) &= 0 \\
 y+7=0 \quad \text{or} \quad y-3 &= 0 \\
 y &= -7 \quad \quad \quad y = 3
 \end{aligned}$$

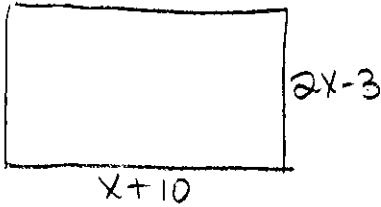
$$\begin{aligned}
 d) \quad 3 &= 6p^2 - 7p \\
 0 &= 6p^2 - 7p - 3 \\
 0 &= 6p^2 - 9p + 2p - 3 \\
 0 &= 3p(2p-3) + 1(2p-3) \\
 0 &= (2p-3)(3p+1) \\
 2p-3=0 \quad \text{or} \quad 3p+1 &= 0 \\
 2p &= 3 \quad \quad \quad 3p &= -1 \\
 p &= \frac{3}{2} \quad \quad \quad p &= -\frac{1}{3}
 \end{aligned}$$

$$\begin{aligned}
 e) \quad 3x^2 + 9x &= 30 \\
 3x^2 + 9x - 30 &= 0 \\
 3(x^2 + 3x - 10) &= 0 \\
 3(x+5)(x-2) &= 0 \\
 x+5=0 \quad \text{or} \quad x-2 &= 0 \\
 x &= -5 \quad \quad \quad x = 2
 \end{aligned}$$

$$\begin{aligned}
 f) \quad 2z^2 &= 3 - 5z \\
 2z^2 + 5z - 3 &= 0 \\
 2z^2 + 6z - z - 3 &= 0 \\
 2z(z+3) - 1(z+3) &= 0 \\
 (z+3)(2z-1) &= 0 \\
 z+3=0 \quad \text{or} \quad 2z-1 &= 0 \\
 z &= -3 \quad \quad \quad 2z &= 1 \\
 \quad \quad \quad \quad \quad z &= \frac{1}{2}
 \end{aligned}$$

Page 230 cont.

11.



Area = $l \cdot w$

a) $54 = (x+10)(2x-3)$

$54 = 2x^2 - 3x + 20x - 30$

$54 = 2x^2 + 17x - 30$

mult = -168

$0 = 2x^2 + 17x - 84$

add = 17

$0 = 2x^2 - 7x + 24x - 84$

$2 \cdot 2 \cdot 3 \cdot 7$

$0 = x(2x-7) + 12(2x-7)$

$0 = (2x-7)(x+12)$

$2x-7=0$ or $x+12=0$

$2x=7$

$x=-12$

$x = \frac{7}{2}$

b) length can't be negative so $x=35$

13. a) $0 = 150t - 5t^2$

b) $0 = -5t^2 + 150t$

$0 = -5t(t-30)$

$-5t=0$ or $t-30=0$

$t=0$ or $t=30$

The flare takes off at water level and returns to the water after 30 sec.

There is a variable so this is relevant to a zero

14. two consecutive even integers \rightarrow integers are x and $x+2$
product is 16 more than 8 times the smaller

$x(x+2) = 8x + 16$
product \swarrow 8 times the smaller \nwarrow 16 more

$x(x+2) = 8x + 16$

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

$x^2 - 6x - 16 = 0$

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

$x-8=0$ or $x+2=0$

$x=8$

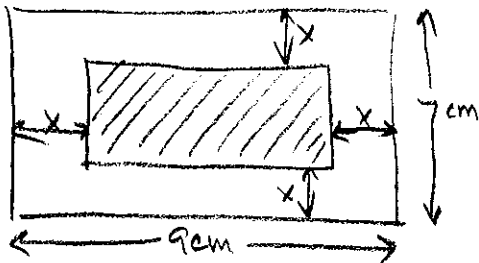
$x=-2$

\rightarrow If $x=-2$ then $x+2=0$
so the numbers are -2 and 0

If $x=8$ then $x+2=10$
so the numbers are 8 and 10

Page 230 cont.

17.



shaded area is 35cm^2

length of shaded area = $9 - 2x$

width of shaded area = $7 - 2x$

a)

$$A = l \cdot w$$

$$35 = (9 - 2x)(7 - 2x)$$

$$35 = 63 - 18x - 14x + 4x^2$$

$$0 = 4x^2 - 32x + 28$$

$$0 = 4(x^2 - 8x + 7)$$

$$0 = 4(x - 7)(x - 1)$$

$$x - 7 = 0 \quad \text{or} \quad x - 1 = 0$$

$$x = 7$$

$$x = 1$$

x can't be 7 because
the width on the
original paper was 7cm
so a 7cm strip could
not be cut off

so the
strip is 1cm

$$\begin{aligned} \text{b) length} &= 9 - 2x \\ &= 9 - 2(1) \\ &= 9 - 2 \\ &= 7\text{cm} \end{aligned}$$

$$\begin{aligned} \text{width} &= 7 - 2x \\ &= 7 - 2(1) \\ &= 7 - 2 \\ &= 5\text{cm} \end{aligned}$$