7.5 Foundations of Math 11

p. 405 #1, 2, 7, 13, 14

1. a) $x^2 - 11x + 28 = 0$
$(x-7)(x-4) = 0$
$x-7=0$, $x-4=0$
$x=7$ $x=4$

b) $x^2 - 7x - 30 = 0$
$(x-10)(x+3) = 0$
$x-10=0$, $x+3=0$
$x=10$ $x=-3$

c) $2y^2 + 11y + 5 = 0$ (mult=10, add=11)
$2y^2 + y + 10y + 5 = 0$
$y(2y+1) + 5(2y+1) = 0$
$(2y+1)(y+5) = 0$
$2y+1=0$, $y+5=0$
$2y=-1$ $y=-5$
$y=-\frac{1}{2}$

d) $4t^2 + 7t - 15 = 0$ (mult=-60, add=7)
$4t^2 + 12t - 5t - 15 = 0$
$4t(t+3) - 5(t+3) = 0$
$(t+3)(4t-5) = 0$
$t+3=0$, $4t-5=0$
$t=-3$ $4t=5$
$t=\frac{5}{4}$

2. a) $x^2 - 121 = 0$
$(x-11)(x+11) = 0$
$x-11=0$, $x+11=0$
$x=11$ $x=-11$

b) $9r^2 - 100 = 0$
$(3r-10)(3r+10) = 0$
$3r-10=0$, $3r+10=0$
$3r=10$ $3r=-10$
$r=\frac{10}{3}$ $r=-\frac{10}{3}$

c) $x^2 - 15x = 0$
$x(x-15) = 0$
$x=0$, $x-15=0$
$x=15$

d) $3y^2 + 48y = 0$
$3y(y+16) = 0$
$3y=0$, $y+16=0$
$y=0$ $y=-16$

e) $s^2 - 12s + 36 = 0$
$(s-6)(s-6) = 0$
$s-6=0$
$s=6$

f) $16p^2 + 8p + 1 = 0$ (mult=16, add=8)
$16p^2 + 4p + 4p + 1 = 0$
$4p(4p+1) + 1(4p+1) = 0$
$(4p+1)(4p+1) = 0$
$4p+1=0$
$4p=-1$
$p=-\frac{1}{4}$

brackets are the same so you need to solve only one

p.405 cont.

2. g) $-14z^2 + 35z = 0$

$-7z(2z-5) = 0$

$-7z = 0 \quad , \quad 2z - 5 = 0$

$z = 0 \qquad 2z = 5$

$z = \frac{5}{2}$

h) $5q^2 - 9q = 0$

$q(5q-9) = 0$

$q = 0 \quad , \quad 5q - 9 = 0$

$5q = 9$

$q = \frac{9}{5}$

7. $x = -5 \quad , \quad x = -12$

$x+5=0 \qquad x+12=0$

$y = (x+5)(x+12)$

13. $P(n) = -0.25n^2 + 6n - 27$

a) break even is zero profit

$\frac{0}{-0.25} = \frac{-0.25n^2}{-0.25} + \frac{6n}{-0.25} - \frac{27}{-0.25}$

$0 = n^2 - 24 + 108$

$0 = (n-6)(n-18)$

$n-6=0 \quad , \quad n-18=0$

$n = 6 \qquad n = 18$

600 or 1800 posters

$-1, -108$
$-2, -54$
$-3, -36$
$-4, -27$
$-6, -18$

b) $5 = -0.25n^2 + 6n - 27$

$\frac{0}{-0.25} = \frac{-0.25n^2}{-0.25} + \frac{6n}{-0.25} - \frac{32}{-0.25}$

$0 = n^2 - 24 + 128$

$0 = (n-8)(n-16)$

$n-8=0 \quad , \quad n-16=0$

$n = 8 \qquad n = 16$

800 or 1600 posters

$-1, -128$
$-2, -64$
$-4, -32$
$-8, -16$

p.405 cont.

13. c) $9 = -0.25n^2 + 6n - 27$

$\frac{0}{-0.25} = \frac{-0.25n^2}{-0.25} + \frac{6n}{-0.25} - \frac{36}{-0.25}$

$0 = n^2 - 24n + 144$

$0 = (n-12)(n-12)$

$n-12=0$

$n=12$

1200 posters

-1, -144
-2, -72
-3, -48
-4, -36
-6, -24
-8, -18
-12, -12

d) domain - the number of posters she can sell

$\{n \mid n \geq 0, n \in W\}$

range - the profit she can make

$\{p \mid -27000 \leq p \leq 9000\}$

↑ 0 posters sold

↑ 1200 posters sold

14. $h(t) = -25t^2 - 5t + 1260$

a) $0 = -25t^2 - 5t + 1260$

$0 = -5(5t^2 + t - 252)$

$0 = -5[5t^2 - 35t + 36t - 252]$

$0 = -5[5t(t-7) + 36(t-7)]$

$0 = -5(t-7)(5t+36)$

$t-7=0$, $5t+36=0$

$t=7$ $5t=-36$

$t = \frac{-36}{5}$

7 seconds

↑ discard because time cannot be negative

b) domain - $\{t \mid 0 \leq t \leq 7\}$

↑ rock starts to fall

↑ rock hits the water