Advanced Algebra – Ch 5 Review Name KEY

1. Solve using any method. (Answers must be exact)

a. $3x^2 - 21x + 3 = 0$

$3(x^2 - 7x + 1) = 0$

Factor? a b c

Quadratic Equation: $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(1)}}{2(1)}$

$x = \frac{7 \pm \sqrt{49 - 4}}{2}$

$\sqrt{45} = \sqrt{9 \cdot 5} = 3\sqrt{5}$

$x = \frac{7 \pm \sqrt{45}}{2} = ?$ $x = \frac{7 \pm 3\sqrt{5}}{2}$

b. $4x^2 = -4x - 4$

$+4x \quad +4x \quad +4$

$4x^2 + 4x + 4 = 0$

$4(x^2 + x + 1) = 0$

Quadratic: $x = \frac{-1 \pm \sqrt{1 - 4(1)(1)}}{2(1)}$

$x = \frac{-1 \pm \sqrt{1 - 4}}{2}$

$x = \frac{-1 \pm \sqrt{-3}}{2}$

$x = \frac{-1 \pm \sqrt{3}\,i}{2}$

c. $64x^2 - 225 = 0$

$+225 \quad +225$

$64x^2 = 225$

$\frac{64x^2}{64} = \frac{225}{64}$

$\sqrt{x^2} = \sqrt{\frac{225}{64}}$

$x = \pm\sqrt{\frac{225}{64}}$

$x = \pm\frac{15}{8}$

2. Solve completely by factoring.

a. $12x^2 - 26x = 10$

$-10 \quad -10$

$\frac{12x^2}{2} - \frac{26x}{2} - \frac{10}{2} = 0$

$2(6x^2 - 13x - 5) = 0$

$2(3x + 1)(2x - 5) = 0$

$3x + 1 = 0 \quad 2x - 5 = 0$

$x = -\frac{1}{3} \quad x = \frac{5}{2}$

b. $4x^2 - 12x + 9 = 0$

$(2x - 3)(2x - 3)$

$2x - 3 = 0$

$x = \frac{3}{2}$ multiplicity 2

7. The expression $P(x) = 2500x - 2x^2$ describes the profit of a company that customizes bulldozers when it customizes x bulldozers a month. $P(x) = -2x^2 + 2500x + 0$

a. How many bulldozers per month must the company customize to make the maximum possible profit?

Vertex

Vertex: $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

$x = \frac{-b}{2a} = \frac{-2500}{2(-2)} = \frac{-2500}{-4} = 625$

625 bulldozers

b. What is the maximum profit?

$P(625) = -2(625)^2 + 2500(625)$

$P(625) = 781,250$

$781,250

8. Marnie throws a softball straight up into the air. The height h of the ball, in feet, can be written as functions of time t, in seconds, as $h(t) = -16t^2 + 40t + 5$

a. What is the maximum height the ball reaches?

Vertex: $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

Vertex

$t = \frac{-b}{2a} \Rightarrow \frac{-40}{2(-16)} \Rightarrow \frac{-40}{-32} = \frac{5}{4}$

$h\left(\frac{5}{4}\right) = -16\left(\frac{5}{4}\right)^2 + 40\left(\frac{5}{4}\right) + 5$

$h\left(\frac{5}{4}\right) = 30$

30 ft

Vertex: $\left(\frac{5}{4}, 30\right)$

b. How many seconds after the ball was thrown does it reach it's maximum height?

1.25 seconds

c. What was the height of the ball when it was thrown?

$t = 0$

$h(0) = -16(0)^2 + 40(0) + 5$

$h(0) = 5$

5 ft

d. How long will it take the ball to hit the ground after it is thrown?

$h = 0$

$0 = -16t^2 + 40t + 5$

$x = \frac{-40 \pm \sqrt{40^2 - 4(-16)(5)}}{2(-16)} \Rightarrow \frac{-40 \pm \sqrt{1600 + 320}}{-32} = \frac{-40 \pm \sqrt{1920}}{-32} = \frac{-40 \pm 43.82}{-32}$

$\frac{-40 + 43.82}{-32} = -.119$

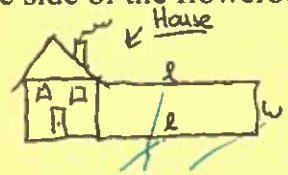
$\frac{-40 - 43.82}{-32} = 2.619$

2.619 seconds

9. Georgia would like to enclose a small flowerbed that is next to her house. She has 50 feet of fencing available to enclose this area. The house already encloses one side of the flowerbed.

a. Find the dimensions of the enclosed area.

b. What is the maximum area that is to be enclosed?



$l + l + w = 50$

$2l + w = 50$

$w = 50 - 2l$

$A = w \cdot l$

$A = (50 - 2l)l$

$A = 50l - 2l^2$

$A = -2l^2 + 50l$

Vertex

$l = \frac{-b}{2a} = \frac{-50}{2(-2)} = \frac{-50}{-4} = 12.5$ ft

$l = 12.5$ ft

Maximum

$w = 50 - 2(12.5)$

$w = 25$ ft

$l = 12.5$ ft

$w = 25$ ft

Max Area $= 12.5 \cdot 25 = 312.5$ ft^2