Midterm Three Study Guide Solutions Group 1

Name Katrin Huelse

Directions: Show all work & simplify your answers for full credit. Circle your final answers. Use additional paper as necessary.

Solve by completing the square. (Know how to solve problems with i in the solution.)

a) $x^2 + 4x + 6 = 0$	b) $9x^2 - 36x = -40$	c) $2x^2 - 3x - 5 = 0$

$2x^2+4x+6=0$ 1-6

$x^2+4x = -6$ 1+4 $\left(\frac{4}{2}\right)^2 = (2)^2 = 4$

$x^2+4x+4 = -2$

$(x+2)^2 = -2$ $\sqrt{}$

$x+2 = \pm\sqrt{(-2)}$ 1-2

$\boxed{x = -2 \pm i\sqrt{2}}$

b. $9x^2 - 36x = -40$ 1:9

$x^2 - 4x = -40/9$ 1+4 $\left(\frac{-4}{2}\right)^2 = (-2)^2 = 4$

$x^2 - 4x + 4 = -4/9$

$(x-2)^2 = -4/9$ $\sqrt{}$

$x-2 = \pm\sqrt{(-4/9)}$ 1+2

$x = 2 \pm i\sqrt{4/9}$

$\boxed{x = 2 \pm 2/3\, i}$ $x = \frac{6 \pm 2i}{3}$

c. $2x^2 - 3x - 5 = 0$ 1+5

$2x^2 - 3x = 5$ 1:2

$x^2 - 3/2\,x = 5/2$ 1+9/16 $\left(\frac{-3/2}{2}\right)^2 = \left(\frac{-3}{4}\right)^2 = 9/16$

$x^2 - 3/2\,x + 9/16 = 49/16$

$(x - 3/4)^2 = 49/16$ $\sqrt{}$

$x - 3/4 = \pm\sqrt{49/16}$ 1+3/4

$x = 3/4 \pm 7/4$

$\boxed{x = 5/2 \text{ or } x = -1}$

Find 3 similar problems from your text, copy them, and show your solutions. Be sure to include the page number.

5 point extra credit opportunity due 5/8 at 11:10

see next page!

Similar problems: ch. 11.1, p. 641

(37) $x^2 + 6x + 2 = 0$ $\quad |-2$

$x^2 + 6x = -2$ $\quad |+9$ $\quad \left(\frac{6}{2}\right)^2 = (3)^2 = 9$

$x^2 + 6x + 9 = 7$

$(x+3)^2 = 7$ $\quad |\sqrt{\ }$

$x + 3 = \pm\sqrt{7}$ $\quad |-3$

$\boxed{x = -3 \pm \sqrt{7}}$

(41) $x^2 + 2x - 5 = 0$ $\quad |+5$

$x^2 + 2x = 5$ $\quad |+1$ $\quad \left(\frac{2}{2}\right)^2 = (1)^2 = 1$

$x^2 + 2x + 1 = 6$

$(x+1)^2 = 6$ $\quad |\sqrt{\ }$

$x + 1 = \pm\sqrt{6}$ $\quad |-1$

$\boxed{x = -1 \pm \sqrt{6}}$

(47) $2x^2 + 7x = 4$ $\quad |:2$

$x^2 + \frac{7}{2}x = 2$ $\quad |+\frac{49}{16}$ $\quad \left(\frac{\frac{7}{2}}{2}\right)^2 = \left(\frac{7}{4}\right)^2 = \frac{49}{16}$

$x^2 + \frac{7}{2}x + \frac{49}{16} = \frac{81}{16}$

$\left(x + \frac{7}{4}\right)^2 = \frac{81}{16}$ $\quad |\sqrt{\ }$

$x + \frac{7}{4} = \pm\sqrt{\frac{81}{16}}$ $\quad |-\frac{7}{4}$

$x = -\frac{7}{4} \pm \frac{9}{4}$

$\boxed{\begin{array}{l} x = \frac{1}{2} \\ \text{or } x = -4 \end{array}}$

Pg. 660 Section 11.3

10. $\frac{5}{x-2} + \frac{4}{x+2} = 1$ $\quad (x+2)(x-2) = x^2-2x+2x-4 = x^2-4$

$\left(\frac{5}{x-2}\right)(x-2)(x+2) + \left(\frac{4}{x+2}\right)(x-2)(x+2) = 1(x-2)(x+2)$

$5x+10+4x-8 = x^2-4$

$9x+2 = x^2-4$

$-9x \quad -2 \quad -2$

$0 = x^2-9x-6$

$x = \frac{-(-9) \pm \sqrt{(-9)^2-4(1)(-6)}}{2(1)}$

$= \frac{9 \pm \sqrt{81+24}}{2} = \frac{9 \pm \sqrt{105}}{2}$

$x = \frac{9+\sqrt{105}}{2}$ or $\frac{9-\sqrt{105}}{2}$

$x = 9.6235$ or -0.6235

29. $a^4-5a^2+6 = 0 \quad a^2 = x$

$x^2-5x+6 = 0$

$x = \frac{-(-5) \pm \sqrt{(-5)^2-4(1)(6)}}{2(1)}$

$x = \frac{5 \pm \sqrt{25-24}}{2}$

$= \frac{5 \pm 1}{2} = \frac{6}{2}$ or $\frac{4}{2}$

$x = 3$ or 2

$\sqrt{a^2} = \sqrt{3} \qquad \sqrt{a^2} = \sqrt{2}$

$a = \pm\sqrt{3}$ or $a = \pm\sqrt{2}$

41. $2x^{2/3}+3x^{1/3}-2 = 0 \qquad x^{1/3} = y$

$2y^2+3y-2 = 0$

$y = \frac{-(3) \pm \sqrt{(3)^2-4(2)(-2)}}{2(2)}$

$= \frac{-3 \pm \sqrt{9+16}}{4}$

$= \frac{-3 \pm \sqrt{25}}{4} = \frac{-3 \pm 5}{4} = \frac{-3+5}{4}$ or $\frac{-3-5}{4}$

$y = 1/2$ or -2

$(x^{1/3})^3 = (1/2)^3 \qquad (x^{1/3})^3 = (-2)^3$

$x = 1/8$ or $x = -8$

group 2

1. a) $\frac{3}{x^2-8x+15} = \frac{3x}{x-3} - \frac{x}{x-5}$

$(x-3)(x-5)\left(\frac{3}{(x^2-8x+15)}\right) = (x-3)(x-5)\left(\frac{3x}{x-3}\right) - (x-3)(x-5)\left(\frac{x}{x-5}\right)$

$3 = (3x)(x-5) - (x)(x-3)$

$3 = 3x^2 - 15x - x^2 + 3x$

$3 = 2x^2 - 12x$

$2x^2 - 12x - 3 = 0$

$x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(2)(-3)}}{2(2)}$

$= \frac{12 \pm \sqrt{144+24}}{2(2)} = \frac{12 \pm \sqrt{168}}{4}$

$x = \frac{12 \pm 2\sqrt{42}}{4} = \frac{2(6 \pm \sqrt{42})}{2(2)}$

Leave like this → $x = \frac{6+\sqrt{42}}{2}$ or $= \frac{6-\sqrt{42}}{2}$

$x = 6.2404$ or -0.2404

b) $3x^{2/3} - 7x^{1/3} = 6 \quad x^{1/3} = y$

$3y^2 - 7y = 6$

$-6 \quad -6$

$3y - 7y - 6 = 0$

$y = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(3)(-6)}}{2(3)}$

$= \frac{7 \pm \sqrt{49+72}}{6} = \frac{7 \pm \sqrt{121}}{6}$

$y = \frac{7 \pm 11}{6} = \frac{7+11}{6}$ or $\frac{7-11}{6}$

$y = 3$ or $-2/3$

$(x^{1/3})^3 = (3)^3 \quad (x^{1/3})^3 = (-2/3)^3$

$x = 27$ or $x = -8/27$

c) $\rho^4 + 7\rho^2 - 8 = 0 \quad \rho^2 = x$

$x^2 + 7x - 8 = 0$

$x = \frac{-(7) \pm \sqrt{(7)^2 - 4(1)(-8)}}{2(1)}$

$= \frac{-7 \pm \sqrt{49+32}}{2} = \frac{-7 \pm \sqrt{81}}{2}$

$= \frac{-7 \pm 9}{2} = \frac{-7+9}{2}$ or $\frac{-7-9}{2}$

$x = 1$ or -8

$\sqrt{\rho^2} = \sqrt{1} \qquad \sqrt{\rho^2} = \sqrt{-8}$

$\rho = \pm\sqrt{1} \qquad \rho = \pm\sqrt{-8}$

$\rho = \pm 1 \qquad = \pm i\sqrt{2^2 \cdot 2}$

$= \pm i2\sqrt{2}$

$\rho = \pm 1$ or $\rho = \pm i2\sqrt{2}$

$\rho = \pm 2i\sqrt{2}$

Midterm Three Study Guide Solutions

Group 3

Name Edgar Molina

Directions: Show all work & simplify your answers for full credit. Circle your final answers. Use additional paper as necessary.

The cost C in dollars of manufacturing x bicycles at Holladay's Production Plant is given by the function $C(x) = 2x^2 - 800x + 92,000$.

a) Clearly define your variables.

b) Find the number of bicycles that must be manufactured to find to minimize the cost.

c) Find the minimum cost of manufacturing the bicycles.

d)Find the number of bicycles that can be manufactured at a cost of $100,200.

a) C = cost in $ manufacture bikes (dependent)

x = # of bikes manufactured (independent)

$C(x) = 2x^2 - 800x + 92,000$

$C(x) - 92,000 = 2x^2 - 800x$

$C(x) - 92,000 = 2(x^2 - 400x + 40,000)$

$+80,000$

$C(x) - 12,000 = 2(x^2 - 400x + 40,000)$

$C(x) = 2(x - 200)^2 + 12,000$

b) 200 bikes must be manufactured to minimize cost.

c) The minimum cost of manufacturing 200 bikes is $12,000.

d) $100,200 = 2(x - 200)^2 + 12,000$

$88,200 = 2(x - 200)^2$

$\sqrt{44100} = \sqrt{(x - 200)^2}$

$210 = x - 200$

$410 = x$

410 bikes can be manufactured with $100,200.

✓

Find a similar problem from your text, copy it, and show your solution. Be sure to include the page number.

5 point extra credit opportunity

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pg. 689 #47

If Queen Gasper throws a ball upward with an initial speed of 32 ft per second, then its height h in feet after t seconds is given by the equation $h(t) = -16t^2 + 32t$.

a. h = height in feet (dependent)
t = seconds after ball is released (independent)

$h(t) = -16t^2 + 32t$

$h(t) = -16(t^2 - 2t + 1)$

$h(t) - 16 = -16(t^2 - 2t + 1)$

$h(t) - 16 = -16(t-1)^2$

$h(t) = -16(t-1)^2 + 16$

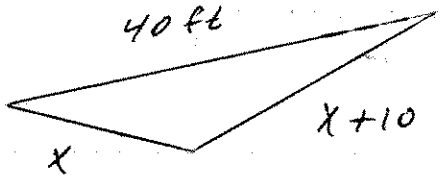
$(1, 16)$

b. The maximum height of the ball is 16 ft in 1 second.

grp4 Uriel Mendoza

Given the diagram, approximate to the nearest foot how many feet of walking distance a person saves by cutting across the lawn instead of walking on the sidewalk.

a) In your own words, paraphrase what the problem is asking.



Find the distance a person can save by walking through the lawn instead of using the sidewalk.

b) Clearly define your variables.

let x = distance in ft.

c) Solve

$$a^2+b^2=c^2$$

$$x^2+(x+10)^2=(40)^2$$
$$x^2+x^2+20x+100=1600$$
$$2x^2+20x+100=1600$$
$$-100 \quad -100$$
$$\frac{2x^2+20x}{2}=\frac{1500}{2}$$
$$x^2+10x=750$$
$$x^2+10x+25=750+25$$
$$(x+5)^2=775$$
$$\sqrt{(x+5)^2}=\pm\sqrt{775}$$
$$x+5=\pm\sqrt{775}$$
$$-5 \quad -5$$

$$\left(\frac{10}{2}\right)^2=(5)^2=25$$
$$x=-5\pm\sqrt{775}$$
$$x=-5\pm\sqrt{25\cdot 31}$$
$$x=-5\pm 5\sqrt{31}$$
$$x=22.84$$
$$x=-32.84$$

$$x+x+10=$$
$$22.84+22.84+10=55.68$$
$$55.68-40=15.68$$

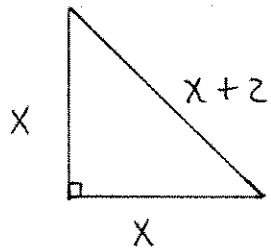
d) A person saves 16 ft by cutting across the lawn instead of walking on the sidewalk.

53
pg 652)

The hypotenuse of an isosceles right triangle is 2 centimeters longer than either of its legs. Find the exact length of each side. (Hint: An isosceles right triangle is a right triangle whose legs are the same length.)

a) In your own words, paraphrase what the problem is asking to do.

Find the length of each side of the triangle.



b) Clearly define your variables.

Let x = Length in centimeters.

c) Solve $a^2+b^2=c^2$

$$x^2+x^2=(x+2)^2$$
$$2x^2=x^2+4x+4$$
$$-x^2 \quad -x^2$$
$$x^2=4x+4$$
$$-4x-4 \quad -4x-4$$
$$x^2-4x-4=0$$
$$a \quad b \quad c$$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

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

$$x=\frac{4\pm\sqrt{16+16}}{2}$$

$$x=\frac{4\pm\sqrt{32}}{2}$$

$$x=\frac{4\pm\sqrt{16\cdot 2}}{2}$$

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

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

$$x+2=2+2\pm 2\sqrt{2}$$
$$=4\pm 2\sqrt{2}$$

d) The lengths of the sides are:

$2\pm 2\sqrt{2}$ cm, $2\pm 2\sqrt{2}$ cm, and $4\pm 2\sqrt{2}$ cm.

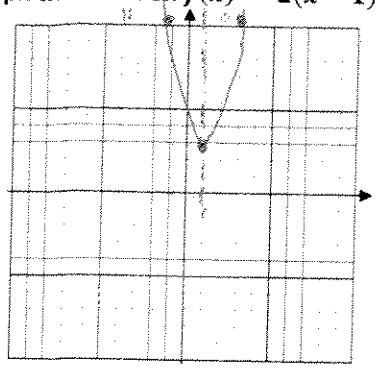
Midterm Three Study Guide Solutions

Group 5

Name Jesse Slater

Directions: Show all work & simplify your answers for full credit. Circle your final answers. Use additional paper as necessary.

Graph the function $f(x) = 2(x-1)^2 + 3$.



a) opens up or down: up

b) vertex: (1, 3)

c) axis of symmetry: $x = 1$

d) 2 additional points on the graph (show work below):

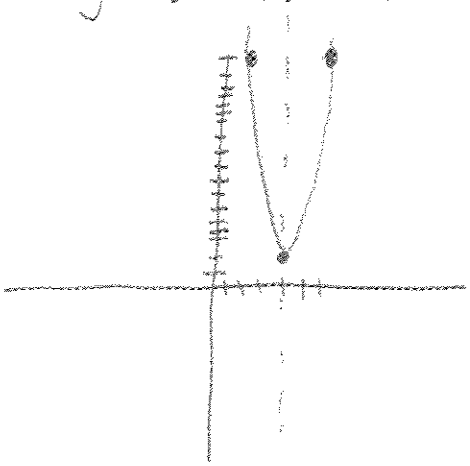
(3, 11) and (-1, 11)

$x = 3$ $\quad 3-1 = 2^2 = 4 \cdot 2 = 8 + 3 = 11$

$x = -1$ $\quad -1$

#26 pg 680

$g(x) = 4(x-4)^2 + 2$



opens: up

vertex: (4, 2)

axis of sym: $x = 4$

2 add. points: (2, 18) and (6, 18)

$4(2-4)^2 + 2$

$4(-2)^2 + 2$

$4(4) + 2$

$16 + 2 = 18$

Find a similar problem from your text, copy it, and show your solution. Be sure to include the page number.

5 point extra credit opportunity

due 5/8 at 11:10

Midterm Three Study Guide Solutions

Group 6

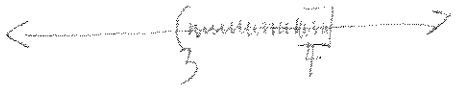
Name Tristan Sheldon

Directions: Show all work & simplify your answers for full credit. Circle your final answers. Use additional paper as necessary.

Solve the inequality. Then graph your solution and write it in interval notation.

a) $6x - 4 \leq 2x$ or $-2x < -6$

a. $6x-4 \leq 2x$ or $-2x < -6$
$-2x \quad -2x \qquad -2 \quad -2$
$4x \leq 4$
$x \leq 1$ or $x > 3$



$(3, 4]$

$(-\infty, 1] \cup (3, \infty)$

b) $\left|\frac{7y+28}{4}\right| > 7$

$\left|\frac{7y+28}{4}\right| > 7 \cdot 4$

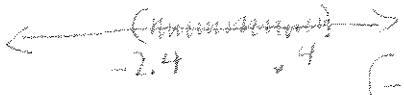
$|7y+28| > 28$

$7y+28 > 28$ or $7y+28 < -28$
$-28 \quad -28 \qquad -28 \quad -28$
$7y > 0 \qquad 7y < -56$
$y > 0$ or $y < -8$

$(-\infty, -8) \cup (0, \infty)$

c) $|5x + 5| + 6 < 13$

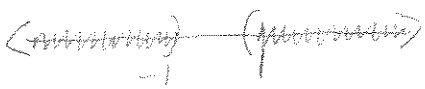
$|5x+5| + 6 < 13$
$-6 \quad -6$
$|5x+5| < 7$
$-7 < 5x+5 < 7$
$-5 \quad -5 \quad -5$
$-12 < 5x < 2$
$\frac{-12}{5} < \frac{5x}{5} < \frac{2}{5}$
$-2.4 < x < .4$



$(-2.4, .4)$

(31) $|y| > 1$

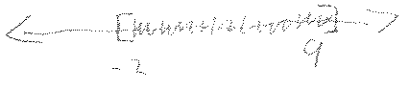
$y > 1$ or $y < -1$



$(-\infty, -1) \cup (1, \infty)$

(41) $|2x - 7| \leq 11$

$-11 \leq 2x - 7 \leq 11$
$+7 \quad +7 \quad +7$
$-4 \leq 2x \leq 18$
$\frac{-4}{2} \leq \frac{2x}{2} \leq \frac{18}{2}$
$-2 \leq x \leq 9$



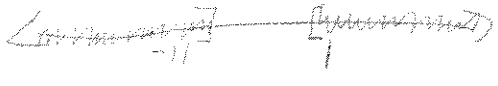
$[-2, 9]$

(43) $|x+5| + 2 \geq 8$

$|x+5| \geq 6$

$x + 5 \geq 6$ or $x + 5 \leq -6$

$x \geq 1$ or $x \leq -11$



$(-\infty, -11] \cup [1, \infty)$

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31, 41, 43

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Midterm Three Study Guide Solutions

Group 7

Name Arin Lal

Directions: Show all work & simplify your answers for full credit. Circle your final answers. Use additional paper as necessary.

Solve.

a) $\|5x+1\| = \|4x-7\|$	b) $8 + \|4m\| = -\|-24\|$	c) $\|5x-2\| = 0$

i) $5x+1 = 4x-7$

$5x = 4x-8$

$x = -8$

ii) $5x+1 = -4x+7$

$5x = -4x+6$

$9x = 6$

$x = \frac{6}{9}$

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

no soln

$5x-2=0$

$5x = 2$

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

Section 9.2, pg 534

Q65) $|2y-3| = |9-4y|$

i) $2y-3 = 9-4y$

$2y = 12-4y$

$6y = 12$

$y = 2$

ii) $2y-3 = -9+4y$

$2y = -6+4y$

$-2y = -6$

$y = 3$

b)

Q72) $\left|\frac{5d+1}{6}\right| = -|9|$

no soln

c)

Q45) $|8n+1| = 0$

$8n+1 = 0$

$8n = -1$

$n = -\frac{1}{8}$

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