

Name: Caleb McWhorter — Solutions

MATH 100

Fall 2021

HW 11: Due 11/08

“Whoever said money can’t buy happiness simply didn’t know where to go shopping.”

–Bo Derek

Problem 1. (10pt) Solve $x^2 + 2x - 3 = 0$ by factoring. Show all your work.

Solution.

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

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

But then either $x + 3 = 0$, which implies $x = -3$, or $x - 1 = 0$, which implies $x = 1$. Therefore, $x = -3, 1$.

Problem 2. (10pt) Solve $x^2 - 9x + 20 = 0$ by factoring. Show all your work.

Solution.

$$x^2 - 9x + 20 = 0$$

$$(x - 4)(x - 5) = 0$$

But then either $x - 4 = 0$, which implies $x = 4$, or $x - 5 = 0$, which implies $x = 5$. Therefore, $x = 4, 5$.

Problem 3. (10pt) Solve $x^2 = 3x + 18$ by factoring. Show all your work.

Solution.

$$x^2 = 3x + 18$$

$$x^2 - 3x - 18 = 0$$

$$(x - 6)(x + 3) = 0$$

But then either $x - 6 = 0$, which implies $x = 6$, or $x + 3 = 0$, which implies $x = -3$. Therefore, $x = -3, 6$.

Problem 4. (10pt) Solve $5x = 14 - x^2$ by factoring. Show all your work.

Solution.

$$5x = 14 - x^2$$

$$x^2 + 5x - 14 = 0$$

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

But then either $x - 2 = 0$, which implies $x = 2$, or $x - 7 = 0$, which implies $x = 7$. Therefore, $x = 2, 7$.

Problem 5. (10pt) Solve $x^2 = 6x - 9$ by factoring. Show all your work.

Solution.

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

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

$$(x - 3)(x - 3) = 0$$

$$(x - 3)^2 = 0$$

$$\sqrt{(x - 3)^2} = \sqrt{0}$$

$$x - 3 = 0$$

$$x = 3$$

Problem 6. (10pt) Solve $x^2 - 7x - 18 = 0$ using the quadratic formula. Show all your work.

Solution.

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

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(-18)}}{2(1)}$$

$$x = \frac{7 \pm \sqrt{49 + 72}}{2}$$

$$x = \frac{7 \pm \sqrt{121}}{2}$$

$$x = \frac{7 \pm 11}{2}$$

$$x = \frac{7 + 11}{2}, \frac{7 - 11}{2}$$

$$x = \frac{18}{2}, \frac{-4}{2}$$

$$x = -2, 9$$

Problem 7. (10pt) Solve $x^2 + 7x + 6 = 0$ using the quadratic formula. Show all your work.

Solution.

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

$$x = \frac{-7 \pm \sqrt{7^2 - 4(1)6}}{2(1)}$$

$$x = \frac{-7 \pm \sqrt{49 - 24}}{2}$$

$$x = \frac{-7 \pm \sqrt{25}}{2}$$

$$x = \frac{-7 \pm 5}{2}$$

$$x = \frac{-7 + 5}{2}, \frac{-7 - 5}{2}$$

$$x = \frac{-2}{2}, \frac{-12}{2}$$

$$x = -6, -1$$

Problem 8. (10pt) Solve $2x^2 - 5x - 12 = 0$ using the quadratic formula. Show all your work.

Solution.

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

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-12)}}{2(2)}$$

$$x = \frac{5 \pm \sqrt{25 + 96}}{4}$$

$$x = \frac{5 \pm \sqrt{121}}{4}$$

$$x = \frac{5 \pm 11}{4}$$

$$x = \frac{5 + 11}{4}, \frac{5 - 11}{4}$$

$$x = \frac{16}{4}, \frac{-6}{4}$$

$$x = -\frac{3}{2}, 4$$

Problem 9. (10pt) Solve $6x^2 + x = 2$ using the quadratic formula. Show all your work.

Solution. First, we move everything to the left side to obtain: $6x^2 + x - 2 = 0$. Then...

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

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

$$x = \frac{-1 \pm \sqrt{1 + 48}}{12}$$

$$x = \frac{-1 \pm \sqrt{49}}{12}$$

$$x = \frac{-1 \pm 7}{12}$$

$$x = \frac{-1 + 7}{12}, \frac{-1 - 7}{12}$$

$$x = \frac{6}{12}, \frac{-8}{12}$$

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

Problem 10. (10pt) Solve $6x^2 = 2 - 4x$ using the quadratic formula. Show all your work.

Solution. First, we move everything to the left side: $6x^2 + 4x - 2 = 0$. Then...

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

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

$$x = \frac{-4 \pm \sqrt{16 + 48}}{12}$$

$$x = \frac{-4 \pm \sqrt{64}}{12}$$

$$x = \frac{-4 \pm 8}{12}$$

$$x = \frac{-4 + 8}{12}, \frac{-4 - 8}{12}$$

$$x = \frac{4}{12}, \frac{-12}{12}$$

$$x = -1, \frac{1}{3}$$