

EXERCISES FOR APPENDIX: QUADRATIC EQUATIONS

Question 1 In Exercises ?? - ??, find all real solutions. Check your answers, as directed by your instructor.

Problem 1.1 $3\left(x - \frac{1}{2}\right)^2 = \frac{5}{12}$

$$x = \frac{3 \pm \sqrt{5}}{6}$$

Problem 1.2 $4 - (5t + 3)^2 = 3$

$$t = -\frac{4}{5} \text{ (smaller solution)}$$

$$t = -\frac{2}{5} \text{ (larger solution)}$$

Problem 1.3 $3(y^2 - 3)^2 - 2 = 10$

$$y = \pm 1, \pm \sqrt{5}$$

Problem 1.4 $x^2 + x - 1 = 0$

$$x = \frac{-1 \pm \sqrt{5}}{2}$$

Problem 1.5 $3w^2 = 2 - w$

$$w = -1 \text{ (smaller solution)}$$

$$w = \frac{2}{3} \text{ (larger solution)}$$

Problem 1.6 $y(y + 4) = 1$

$$y = -2 \pm \sqrt{5}$$

Problem 1.7 $\frac{z}{2} = 4z^2 - 1$

$$z = \frac{1 \pm \sqrt{65}}{16}$$

Problem 1.8 $0.1v^2 + 0.2v = 0.3$

$$v = -3 \text{ (smaller solution)}$$

$$v = 1 \text{ (larger solution)}$$

Problem 1.9 $x^2 = x - 1$

No real solutions.

Problem 1.10 $3 - t = 2(t + 1)^2$

$$t = \frac{-5 \pm \sqrt{33}}{4}$$

Problem 1.11 $(x - 3)^2 = x^2 + 9$

$$x = 0$$

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Problem 1.12 $(3y - 1)(2y + 1) = 5y$

$$y = \frac{2 \pm \sqrt{10}}{6}$$

Problem 1.13 $w^4 + 3w^2 - 1 = 0$

$$w = \pm \sqrt{\frac{\sqrt{13} - 3}{2}}$$

Problem 1.14 $2x^4 + x^2 = 3$ $x = -1$ (smaller solution) $x = 1$ (larger solution)**Problem 1.15** $(2 - y)^4 = 3(2 - y)^2 + 1$

$$y = \frac{4 \pm \sqrt{6 + 2\sqrt{13}}}{2}$$

Problem 1.16 $3x^4 + 6x^2 = 15x^3$

$$x = 0, \frac{5 \pm \sqrt{17}}{2}$$

Problem 1.17 $6p + 2 = p^2 + 3p^3$

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

Problem 1.18 $10v = 7v^3 - v^5$

$$v = 0, \pm\sqrt{2}, \pm\sqrt{5}$$

Problem 1.19 $y^2 - \sqrt{8}y = \sqrt{18}y - 1$

$$y = \frac{5\sqrt{2} \pm \sqrt{46}}{2}$$

Problem 1.20 $x^2\sqrt{3} = x\sqrt{6} + \sqrt{12}$

$$x = \frac{\sqrt{2} \pm \sqrt{10}}{2}$$

Problem 1.21 $\frac{v^2}{3} = \frac{v\sqrt{3}}{2} + 1$

$$v = -\frac{\sqrt{3}}{2} \text{ (smaller solution)}$$

$$v = 2\sqrt{3} \text{ (larger solution)}$$

Question 2 In Exercises ?? - ??, find all real solutions and use a calculator to approximate your answers, rounded to two decimal places.**Problem 2.1** $5.54^2 + b^2 = 36$

$$b = \pm \frac{\sqrt{13271}}{50} \approx \pm 2.30$$

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Problem 2.2 $\pi r^2 = 37$

$$r = \pm \sqrt{\frac{37}{\pi}} \approx \pm 3.43$$

Problem 2.3 $54 = 8r\sqrt{2} + \pi r^2$

$$r = \frac{-4\sqrt{2} \pm \sqrt{54\pi + 32}}{\pi}, r \approx -6.32, 2.72$$

Problem 2.4 $-4.9t^2 + 100t = 410$

$$t = \frac{500 \pm 10\sqrt{491}}{49}, t \approx 5.68, 14.73$$

Problem 2.5 $x^2 = 1.65(3 - x)^2$

$$x = \frac{99 \pm 6\sqrt{165}}{13}, x \approx 1.69, 13.54$$

Problem 2.6 $(0.5 + 2A)^2 = 0.7(0.1 - A)^2$

$$A = \frac{-107 \pm 7\sqrt{70}}{330}, A \approx -0.50, -0.15$$

Question 3 In Exercises ?? - ??, use Theorem ?? along with the techniques in this section to find all real solutions to the following.

Problem 3.1 $|x^2 - 3x| = 2$

$$x = 1, 2, \frac{3 \pm \sqrt{17}}{2}$$

Problem 3.2 $|2x - x^2| = |2x - 1|$

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

Problem 3.3 $|x^2 - x + 3| = |4 - x^2|$

$$x = -\frac{1}{2}, 1, 7$$

Problem 4 Prove that for every nonzero number p , $x^2 + xp + p^2 = 0$ has no real solutions.

The discriminant is: $D = p^2 - 4p^2 = -3p^2 < 0$. Since $D < 0$, there are no real solutions.

Problem 5 Solve for t : $-\frac{1}{2}gt^2 + vt + h = 0$. Assume $g > 0$, $v \geq 0$ and $h \geq 0$.

$$t = \frac{v \pm \sqrt{v^2 + 2gh}}{g}$$