

Unit 3: Polynomial & Rational Equations & Inequalities

Solving Polynomial Equations

Recall: To solve an equation means finding the real roots of the equation.

When solving a quadratic equation, there are several options, such as:

- factoring to find the zeroes (roots)
- graphing
- completing the square (vertex form) and solving for $y=0$
- quadratic formula

Polynomial equations of degree 3 or higher can be solved by:

- graphing
- factoring down to degree 2 (quadratic), then applying one of the techniques listed above

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Solving Polynomial Equations

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- (1) Rewrite the equation so it is equal to zero.
- (2) Define the resulting polynomial as a function and apply the factor theorem.
- (3) Factor out the first term (polynomial division), and repeat until in a fully factored form.
- (4) Find the roots of the equation (i.e., set it back to zero and solve).
- (5) Ignore solutions that are outside of the domain defined by the conditions of the problem.

Ex.1 Solve $3x^3 + 8x^2 = -3x + 2$

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Ex.3 A box is in the shape of a rectangular prism. One side is a square, and the length is 12 units longer than the square sides. The volume of the box is 135 cubic units. What are the dimensions of the box?

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Assigned Work:
p.204 # 6, 7ad (10) 13, (16)

10.

$$V = (30-2x)(20-2x)(x)$$

$$1008 = (\quad)(\quad)(\quad)$$

$$0 = (\quad)(\quad)(\quad) - 1008$$

$$0 = 600x - 60x^2 - 40x^2 + 4x^3 - 1008$$

$$\frac{0}{4} = \frac{4x^3 - 100x^2 + 600x - 1008}{4}$$

$$0 = \frac{x^3 - 25x^2 + 150x - 252}{f(x)}$$

$f(x) = x^3 - 25x^2 + 150x - 252$
 $f(3) = 0$
 $x-3$ is a factor

$$x-3 \overline{) x^2 - 22x + 84}$$

$$0 = (x-3)(x-11+\sqrt{37})(x-11-\sqrt{37})$$

$$x=3, x=11+\sqrt{37}, x=11-\sqrt{37}$$

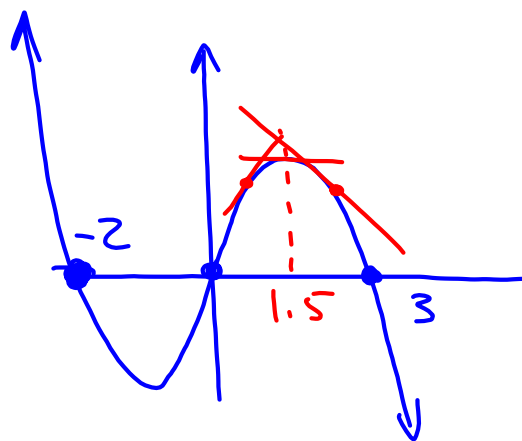
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l:	✓	✓	✗
w:	✓	✓	✗

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$$13(c) \quad d(t) = -3t^3 + 3t^2 + 18t$$

$$= -3t(t^2 - t - 6)$$

$$= -3t(t - 3)(t + 2)$$



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$$16. \quad f(x) = a(x-2)(x-3)(x+5)$$

sub (4, 36)

$$36 = a(4-2)(\quad)(\quad)$$

$$a = 2$$

$$120 = 2(\quad)(\quad)(\quad)$$

$$0 = 2(\quad)(\quad)(\quad) - 120$$

expand & simplify
factor new cubic

$$0 = [\quad] [\quad] [\quad]$$

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