

Review for Quiz #1

Mr. Neeman. 10A, August 8, 2011

#1. Factorize each of the following expressions:

- (a) $4x^2 + 4x - 3$
- (b) $x^2 - 9y^2$
- (c) $x^3 + 1$
- (d) $x^2 + 2x - 1$

#2. Complete the square for each of the following quadratic expressions:

- (a) $x^2 - x + 4$
- (b) $3x^2 + 4x + 1$
- (c) $\frac{1}{2}x^2 + x + 1$
- (d) $x^2 - 10x + 15$

#3. Solve each of the following quadratic equations:

- (a) $x^2 + 7x + 12 = 0$
- (b) $2x^2 - 3x - 1 = 0$
- (c) $x^2 + 2x + 2 = 0$
- (d) $x^2 + 12x = 0$
- (e) $4x^2 + 24x + 36 = 0$

#4. Suppose a ball is dropped from a height of 240 meters above the ground.

- (a) Write down the formula for the height of the ball t seconds after it is dropped.
- (b) How long will the ball take to hit the ground?
- (c) How long will the ball take to reach a height of 100 meters above the ground?
- (d) At what height will the ball be after 4 seconds?

Solutions

#1. Factorize each of the following expressions:

(a) $4x^2 + 4x - 3 = (2x + 3)(2x - 1)$

(b) $x^2 - 9y^2 = (x - 3y)(x + 3y)$

(c) $x^3 + 1 = (x + 1)(x^2 - x + 1)$

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

#2. Complete the square for each of the following quadratic expressions:

(a) $x^2 - x + 4 = (x - \frac{1}{2})^2 + \frac{15}{4}$

(b) $3x^2 + 4x + 1 = 3(x + \frac{2}{3})^2 - \frac{1}{3}$

(c) $\frac{1}{2}x^2 + x + 1 = \frac{1}{2}(x + 1)^2 + \frac{1}{2}$

(d) $x^2 - 10x + 15 = (x - 5)^2 - 10$

#3. Solve each of the following quadratic equations:

(a) $x^2 + 7x + 12 = 0$. So $(x + 3)(x + 4) = 0$, and either $x = -3$ or $x = -4$.

(b) $2x^2 - 3x + 1 = 0$. So $(2x - 1)(x - 1) = 0$, and either $x = \frac{3}{2}$ or $x = 1$.

(c) $x^2 + 2x + 2 = 0$. So $(x + 1)^2 + 1 = 0$, and there are no solutions.

(d) $x^2 + 12x = 0$. So $x(x + 12) = 0$, and either $x = 0$ or $x = -12$.

(e) $4x^2 + 24x + 36 = 0$. So $x^2 + 6x + 9 = 0$, so that $(x + 3)^2 = 0$ and so $x = -3$.

#4. Suppose a ball is dropped from a height of 240 meters above the ground.

(a) Write down the formula for the height of the ball t seconds after it is dropped.

$$y = 240 - 5t^2$$

(b) How long will the ball take to hit the ground?

$0 = 240 - 5t^2$, so that $t^2 = \frac{240}{5} = 48$, and since we only want the positive root, $t = 4\sqrt{3}$ seconds.

(c) How long will the ball take to reach a height of 100 meters above the ground?

$100 = 240 - 5t^2$, so that $t^2 = \frac{140}{5} = 28$, and since we only want the positive root, $t = 2\sqrt{7}$ seconds.

(d) At what height will the ball be after $\frac{5}{2}$ seconds?

$$y = 240 - 5(4)^2 = 240 - 80 = 160 \text{ meters.}$$