

Mth 30, Homework 4 on section 3.2

Due by Wed, Feb 25.

Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 3 points.

Section 3.2 Quadratic Functions

- (1) For the quadratic function $f(x) = 2x^2 + 8x - 10$
- (a) Give the coordinates (h, k) of the vertex of this parabola.
(Use the formulas $h = -b/2a$ and $k = f(h)$ to do this.)
 - (b) Write $f(x)$ in the standard (vertex) form $f(x) = a(x - h)^2 + k$.
 - (c) Give the equation of the axis of symmetry. (Since it is a vertical line, your answer should be $x =$ a number.)
- (2) Let $f(x) = -x^2 - 2x + 3$
- (a) Find the vertex.
 - (b) Find the y intercept.
 - (c) Find the two x intercepts.
(Here you want to solve $f(x) = -x^2 - 2x + 3 = 0$. To make that easier to solve, multiply both sides by -1 to get $x^2 + 2x - 3 = 0$.)
 - (d) Use parts (a), (b), and (c) to carefully sketch the graph of $f(x)$.
- (3) For the function in the previous question:
- (a) Give its domain.
 - (b) Give its range.
 - (c) Where is it increasing and decreasing?
 - (d) Does it have a local maximum or minimum?
- (4) Find the x intercepts of the graph of $g(x) = x^2 - 6x - 1$ using these steps:
- (a) We want to solve $0 = x^2 - 6x - 1$ but the right side does not factor. Instead first write this side in standard (vertex) form to get $0 = a(x - h)^2 + k$.
 - (b) Put the square on one side: $(x - h)^2 = -k/a$
 - (c) That means $x - h$ is plus or minus the squareroot of the right side. Then show that the x intercepts are $x = 3 - \sqrt{10}$ and $x = 3 + \sqrt{10}$. (So the graph crosses the x axis at approximately -0.16 and 6.16 .)

- (5) Find the two real numbers that have the biggest product if their sum is 12. Use these steps:
- (a) To understand what the question is asking you could try some numbers: for example $1 \cdot 11 = 11$ but $3 \cdot 9 = 27$ is bigger.
 - (b) Call the two numbers x and y . Then write the equation that means “their sum is 12” and then solve for y .
 - (c) Write the product xy as a function $f(x)$ that only depends on x .
 - (d) The x we want is the x coordinate of the vertex of the graph of $f(x)$ (since that is where the local maximum is).
 - (e) Give the two numbers x and y that solve the problem.
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If you're stuck on a question:

- Ask me about it after class.
- Come to my office hours: Mon 4:30 - 5:30, Wed 4:30 - 5:30 in CP 317.
- Go to the Math Tutorial Lab in person in CP 303 or online.