## Матн-1200-es31

## 2012 January 6

**1** Let f be the function such that

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

for every possible real number x. Find f(3), showing at least one intermediate step.

I replace 
$$x$$
 everywhere by 3:

$$f(x) = 2x^{2} - 3x + 1;$$
  

$$f(3) = 2(3)^{2} - 3(3) + 1 = 10.$$

**2** Consider the equation

Is the point

Quiz 1

$$\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$$

 $x^2 + y^2 = 1.$ 

on the graph of this equation in the (x, y)-plane? Show what numerical calculation you make to decide. I replace x everywhere by 1/2 and replace y everywhere by  $\sqrt{3}/2$ :

$$x^{2} + y^{2} = 1;$$

$$\left(\frac{1}{2}\right)^{2} + \left(\frac{\sqrt{3}}{2}\right) = 1;$$

$$1 = 1.$$

This is true, so the answer is **yes**.

**3** Let f be the function such that

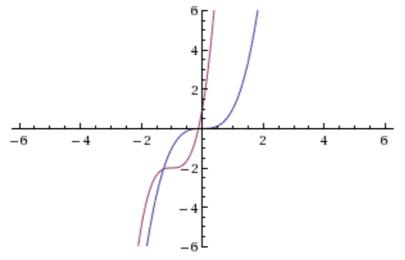
$$f(x) = 3(x+1)^3 - 2$$

for every possible real number x, and similarly let g satisfy

$$g(x) = x^3.$$

Below in blue is a graph of g. Using this as a guide, draw a graph of f on the same plane. To show your work, mark and label at least three points on the graph.

The original graph of g had marked the points (0,0), (1,1), and (-1,-1). Each point is transformed to the left by 1, to 3 times the height or depth, and then down by 2. This moves them, respectively, to (-1,-2), (0,1), and (-2,-5). So the graph of f has these three points; and furthermore, the kink where the graph of g flattened out for an instant at (0,0) becomes a kink where the graph of f flattens out for an instant at (-1,-2). So the graph is below in purple.



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