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*

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

Is the point

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

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.