1. Find a possible formula for an exponential function that could give the graph to the right.

Solution: Let's write the function as \( f(x) = y_0 a^x \). We know that \( f(0) = 2 \), so \( y_0 = 2 \). Then \( f(3) = 2a^3 = 1 \). This gives \( a^3 = \frac{1}{2} \), so \( a = \sqrt[3]{\frac{1}{2}} = \left(\frac{1}{2}\right)^{1/3} \), and the function is \( f(x) = 2 \left(\frac{1}{2}\right)^{x/3} \).

2. On the figures below, which show a function \( f(x) \), sketch on the left \( \frac{1}{2} f(x + 2) \) and on the right \( f(-x) \). Assume that the grid lines are spaced by units of 1 in both directions.

Solution: The first of these is shifted left 2 units and scrunched by a factor of 2. The second is reflected around the \( y \)-axis.

3. For \( g(z) = 3z^2 - 2z \) and \( p(z) = z + h \), find \( g(p(z)) \).

Solution: Plugging in \( p(z) \), we have \( g(p(z)) = g(z + h) \). Replacing each \( z \) in \( g(z) \) with \( z + h \), we get \( g(p(z)) = 3(z + h)^2 - 2(z + h) \).

4. Let \( f(t) = P_0 e^{kt} \). If \( f(1) = 1 \) and \( f(3) = 2 \), find an explicit formula for \( f(t) \).

Solution: We know \( f(1) = P_0 e^k = 1 \) and \( f(3) = P_0 e^{2k} = 2 \), so, multiplying the first equation by 2 and setting them equal, we have \( 2P_0 e^k = P_0 e^{2k} \). Thus \( e^k = 2 \), and \( k = \ln(2) \). Plugging this into \( f(1) = P_0 e^k = 1 \), we get \( P_0 e^{\ln(2)} = 1 \), or \( 2P_0 = 1 \), so \( P_0 = \frac{1}{2} \). The explicit formula for \( f(t) \) is therefore \( f(t) = \frac{1}{2} e^{\ln(2)t} \).