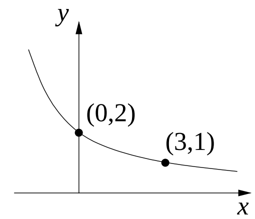
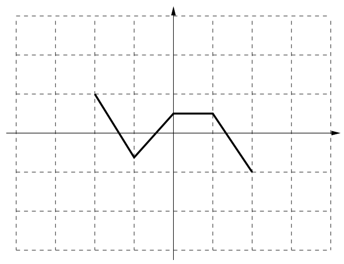
MATH 115-018 QUIZ 2 13 Jan 2005 Name:______________________________

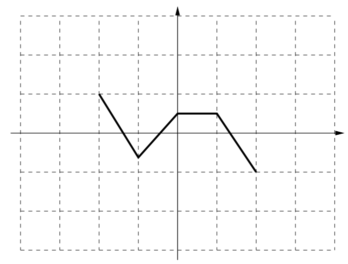
1. Find a possible formula for an exponential function that could give the graph to the right.



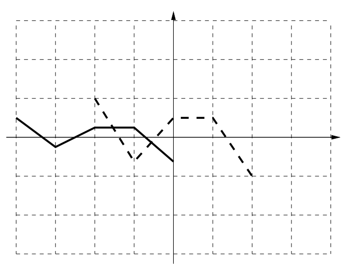
Solution: Let's write the function as $f(x) = y_0\, a^x$. We know that $f(0) = 2$, so $y_0 = 2$. Then $f(3) = 2\,a^3 = 1$. This gives $a^3 = \frac{1}{2}$, so $a = \sqrt[3]{\frac{1}{2}} = (\frac{1}{2})^{1/3}$, and the function is $f(x) = 2\,\left((\frac{1}{2})^{1/3}\right)^x = 2\,(\frac{1}{2})^{x/3}$.

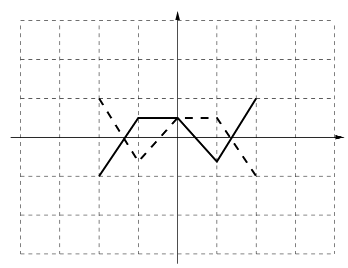
2. On the figures below, which show a function $f(x)$, sketch on the left $\frac{1}{2}\,f(x+2)$ and on the right $f(-x)$. Assume that the grid lines are spaced by units of 1 in both directions.





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 $f(t) = \frac{1}{2}\,e^{\ln(2)t}$.