Fall 09, Precalculus (Honors) Quiz 1 Howard University Mathematics
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SOLUTIONS

1. Find the composition $f \circ g$ of the functions $f(x) = 3x + 1$ and $g(x) = x^2 - 1$.

Soln: $f \circ g(x) = f(g(x)) = 3(g(x)) + 1 = 3(x^2 - 1) + 1 = 3x^2 - 2$.

2.Find the inverse of the function $y = \frac{1}{x+1}$

Soln: First interchange x and y so that inverse function will also be in terms of x. You get $x = \frac{1}{y+1}$. Now solve for y to get the inverse function: $x = \frac{1}{y+1}$ means $y + 1 = 1/x$ and thus $y = (1/x) - 1$.

3.Graph $y = x^2$ and check whether it is a one to one function.

Soln: The graph is a parabola facing up with vertex at (0,0) and it is not one-one because horizontal lines intersect it at two points (the positive and negative squre roots of each $y-$value.

4. Using the graph of $y = e^x$ draw the graph of $y = e^{-x} - 1$.

Soln: To get the graph of $y = e^{-x}$ flip the graph of $y = e^x$ about the $y-$axis and then move it down by 1. The resulting graph should pass through (0,0), (-1, e-1) and (1, (1/e)-1).

5. The amount of $1000 deposited in a certain fund grows according to the formula $A(t) = 1000(1.1)^t$. Find the amount after 3 years.

Soln: $A(3) = 1000(1.1)^3 = 1331$ dollars.

6. The probability of a car arriving within t minutes of 12pm during a day is $F(t) = 1 - e^{-0.1t}$. Using logarithms find the time when the probability is just 0.01 (or 1 percent).

Soln: $0.01 = 1 - e^{-0.1t} \Rightarrow e^{-0.1t} = 0.99$. Thus $ln(0.99) = -0.1t \Rightarrow t = ln(0.99)/(-0.1) = 0.100503$. So there is a 1 percent chance that a car will arrive within 0.100503 minute (0r about 6 seconds) of 12pm.