Quiz 1

Name: Super Student

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Problem 1 (4 points). Find the composit functions f(g(x)) and g(f(x)), and then find all numbers x (if any) such that f(g(x))=g(f(x)). $f(x) = x^2 + 2x - 3$ and $g(x) = x - 1$.

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

$= \boxed{x^2 - 4}$

2) $g(f(x)) = g(x^2 + 2x - 3) = x^2 + 2x - 3 - 1 = \boxed{x^2 + 2x - 4}$

3) $f(g(x)) = g(f(x)) \iff x^2 - 4 = x^2 + 2x - 4$

$0 = 2x$

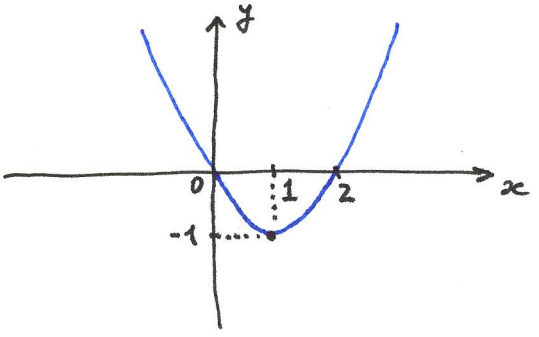
$\boxed{x = 0}$

Problem 2 (3 points). Sketch the graph of the function $f(x) = x^2 - 2x$

1. The graph of $f(x) = x^2 - 2x$ is a parabola that "opens up" $\cup$
2. Vertex

   $x_v = \frac{2}{2} = 1$, $y_v = f(x_v) = f(1) = -1$
3. x-intercepts : $x^2 - 2x = 0 \iff \begin{bmatrix} x = 0 \\ x = 2 \end{bmatrix}$

   y-intercept : $x = 0$, $y = 0$



Problem 3 (3 points). Find the equation of the line that passes through points (0,1) and (1,3)

The slope of this line is $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-1}{1-0} = 2$

Now we can use the point-slope form of the line equation

$y - y_0 = m(x - x_0)$

where $m = 2$

$(x_0, y_0) = (0, 1)$

$\Rightarrow$ $y - 1 = 2(x - 0)$

$\boxed{y = 2x + 1}$