Math 151 Sec F07N03 - Quiz 6 Name: SOLUTIONS
Nov 9 2007 Stu#:

(1)[5 points] Sketch the graph of $y = |x^2 - 2x|$ and give the x and y intercepts.

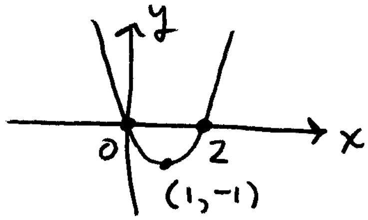
<u>x-intercepts:</u>

$$0 = |x^2 - 2x|$$
$$0 = x^2 - 2x$$
$$0 = x(x-2)$$
$$x = 0, 2$$
$$\therefore (0,0), (2,0)$$

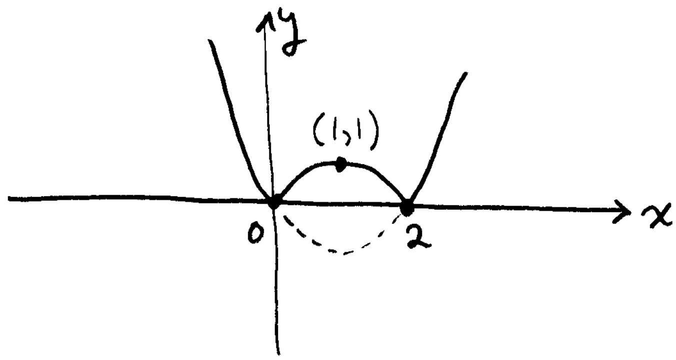
<u>y-intercepts:</u>

$$y = |0^2 - 2(0)|$$
$$y = 0$$
$$\therefore (0,0)$$

For sketch, $y = x^2 - 2x = (x-1)^2 - 1$, which has graph



$\therefore$ $y = |x^2 - 2x|$ has graph



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(2)[5 points] Let $f(x) = \dfrac{1}{2x-1}$ and $g(x) = x^2+1$. Find $f \circ g$ as well as $g \circ f$ and state the domains for each.

$$(f \circ g)(x) = \frac{1}{2(g(x))-1} = \frac{1}{2(x^2+1)-1} = \frac{1}{2x^2+1}$$

For domain, we require that $2(x^2+1)-1 \neq 0$.

Solving $2(x^2+1)-1=0$

$2x^2+1=0$

$x^2 = \frac{-1}{2}$, which has no real solutions.

$\therefore$ domain of $f \circ g$ is $(-\infty, \infty)$

$$(g \circ f)(x) = g(f(x)) = (f(x))^2+1 = \left(\frac{1}{2x-1}\right)^2+1$$

For domain, we require that $2x-1 \neq 0$.

Solving $2x-1=0$, we find $x=\frac{1}{2}$.

$\therefore$ domain of $g \circ f$ is $(-\infty, \frac{1}{2}) \cup (\frac{1}{2}, \infty)$.

(3)[5 points] Let $F(x) = (x^2+2x)^2 + 5\sqrt{x^2+2x}$. Find functions f and g such that $F = f \circ g$.

Let $g(x) = x^2+2x$

$f(x) = x^2 + 5\sqrt{x}$.

Check: $(f \circ g)(x) = f(g(x))$

$= (g(x))^2 + 5\sqrt{g(x)}$

$= (x^2+2x)^2 + 5\sqrt{x^2+2x}$