Quiz 3
Math 111

Name: KEY

Show *all* your work algebraically for each and simplify. No credit is given without supporting work.

1. Let $f(x) = x^2 + 5$, and let $g(x) = f(x-1)$.

   (a) [2] Write the rule of $g(x)$ and simplify.

   $g(x) = f(x-1) = (x-1)^2 + 5 = x^2 - 2x + 1 + 5 = x^2 - 2x + 6$

   (b) [5] Find the difference quotient of $f(x)$. Recall the difference quotient is $\frac{f(x+h) - f(x)}{h}$.

   Do $\frac{f(x+h) - f(x)}{h} = \frac{[(x+h)^2 + 5] - [x^2 + 5]}{h} = \frac{x^2 + 2xh + h^2 + 5 - x^2 - 5}{h}$

   $= \frac{2xh + h^2}{h} = \frac{h(2x+h)}{h} = 2x + h$

2. [2] Without graphing, determine the vertex of the parabola described by $y = -(x - \sqrt{2})^2 + \pi$ and state whether it opens upward or downward.

   vertex $(\sqrt{2}, \pi)$ downward

3. [5] Determine whether the function defined by $f(x) = x(x^4 - x^2) + 4x$ is even, odd, or neither.

future: Justify your result.

$f(-x) = (-x)((-x)^4 - (-x)^2) + 4(-x)$

$= -x(x^4 - x^2) - 4x$

$= -(x(x^4 - x^2) + 4x)$

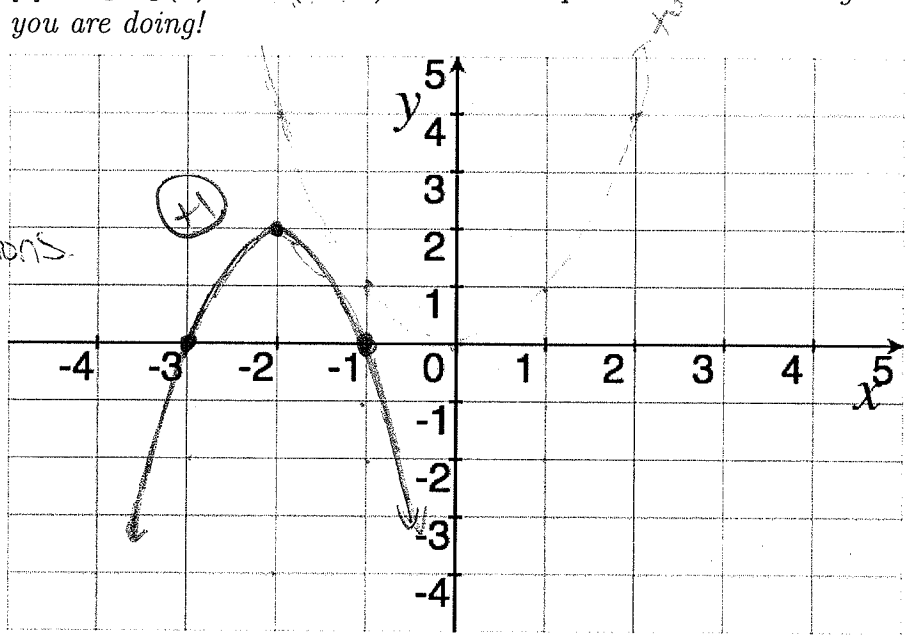
$= -f(x)$

(+2) running $f(-x)$ est
(+1) plug in right

odd (+2)

4. [6] Graph $g(x) = -2(x+2)^2 + 2$. *Note: Partial credit can be given if you tell me what you are doing!*

future: list graph transformations.



vertical flip about the x-axis (1)
vertical stretch by 2 (+1)
vertical shift up by 2 (+1)
horiz. shift left 2 units (+1)

order of vertical shift vs stretch (+1)