Name: _____

Section: 322 □   323 □

1. Determine the domain of

$$f(x) = \frac{\sqrt{x+1}}{x^2 - x}.$$

$x+1 \geq 0 \implies x \geq -1$

$x^2 - x \neq 0 \implies x(x-1) \neq 0 \implies x \neq 0, 1$
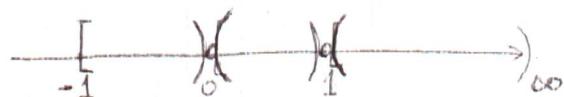

$\text{domain} = [-1, 0) \cup (0, 1) \cup (1, \infty)$

2.

$$f(x) = \begin{cases} x^2 & x \geq 0 \\ -x & x < 0 \end{cases}$$

a. Graph the function $f(x)$.
b. Let $g(x) = f(f(x))$. Compute $g(2), g(0), g(-2)$.

a.
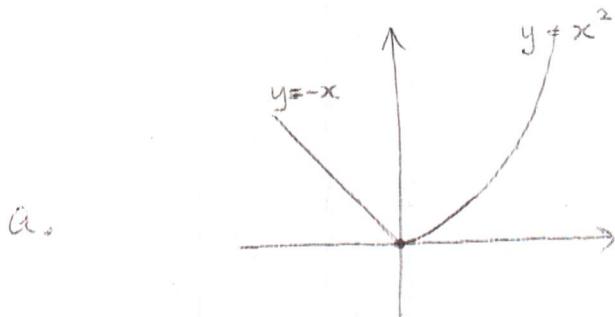
b. $g(2) = f(f(2)) = f(4) = 16$

$g(0) = f(f(0)) = f(0) = 0$

$g(-2) = f(f(-2)) = f(2) = 4$

3. Suppose the annual revenue, in millions of dollars, of a company is $R(t) = t^2 + 2t + 1$ where t is measured in years and $t = 0$ corresponds to the year 2000. The annual cost, in millions of dollars, for the company is $C(t) = 2t + 1$.

a. Find the formula for the profit function $P(t)$.

b. What is the average profit over the first four years (2000-2004)?

a. $P(t) = R(t) - C(t)$

$= \left(t^2 + 2t + 1\right) - (2t + 1)$

$= t^2$ (millions)

b.

average profit $= \dfrac{P(1) + P(2) + P(3) + P(4)}{4}$

$= \dfrac{1^2 + 2^2 + 3^2 + 4^2}{4}$

$= \dfrac{1 + 4 + 9 + 16}{4}$

$= \dfrac{30}{4}$

$= 7.5$ (millions)