11. Consider the function $y = 16/x$. If $x = 4$, and the change in x is $\Delta x = -1$, find the following quantities:

$f(x) = 16/x$

6 pts

(a) the corresponding change in y (Δy)

$$\Delta y = f(x+\Delta x) - f(x).$$
$$= f(3) - f(4) = \frac{16}{3} - \frac{16}{4} = \frac{16\cdot 4 - 16\cdot 3}{12}$$
$$= 16(4-3)/12 = 16/12 = \boxed{4/3}$$

(b) the corresponding differential dy

$$dy = \left.\frac{dy}{dx}\right|_{x=4} \cdot dx$$
$$= \left.\frac{-16}{x^2}\right|_{x=4} \cdot (-1) = \boxed{1}$$

12. Find the **equations** of all the horizontal asymptotes (if any) of the function $f(x) = \dfrac{x}{\sqrt{x^2+1}}$.
You must use limits to obtain your answer.

8 pts

$$\lim_{x\to\infty} \frac{x/x}{\sqrt{\frac{x^2}{x^2} + \frac{1}{x^2}}} \quad (x/x \to 1,\ \frac{1}{x^2} \to 0,\ \frac{x^2}{x^2} \to 1)$$

$x > 0 \to$
$x = \sqrt{x^2}$

$y = 1$

$$\lim_{x\to-\infty} \frac{x/x}{-\sqrt{\frac{x^2}{x^2} + \frac{1}{x^2}}} \quad (x/x \to 1,\ \frac{1}{x^2} \to 0,\ \frac{x^2}{x^2} \to 1)$$

$x < 0 \to$
$x = -\sqrt{x^2}$

$y = -1$