10. Calculate $\lim_{x\to-\infty} \dfrac{\sqrt{x^2+4x}}{4x+1}$. $/x$ $/x$.

13 pts

$$= \lim_{x\to-\infty} \frac{-\sqrt{\frac{x^2+4x}{x^2}}}{\frac{4x}{x}+\frac{1}{x}} \qquad x = -\sqrt{x^2} \text{ for } x<0.$$

$$= \lim_{x\to-\infty} \frac{-\sqrt{1+\frac{4}{x}}}{4+\frac{1}{x}} = -\frac{1}{4}.$$

11. **Extra credit**: If $f(1) = 10$, and $f'(x) \geq 2$ for $1 \leq x \leq 4$, how small can $f(4)$ possibly be? When you apply a theorem, refer to it by name, and show that all the hypotheses of the theorem are satisfied. State your final answer in a complete sentence.

*

$f(x)$ is cont on $[1,4]$, (1)

& $f(x)$ is diff on $(1,4)$, (2).

So by the MVT,

$$f'(c) = \frac{f(4)-f(1)}{4-1}.$$

$$f'(c) \geq 2 \Rightarrow \frac{f(4)-f(1)}{3} \geq 2.$$

$$f(4) \geq 6 + 10$$

The largest $f(4)$ can be is 16.

5 pts

* assuming (1) & (2).