Books, notes (in any form), and calculators are not allowed. *Show all your work.* Good Luck!

1. (5 pts) Evaluate the following limit, if it exists. Clearly indicate $+\infty$ or $-\infty$ in the case of an infinite limit. If the limit does not exist, clearly explain the reason why.

$$\lim_{x \to -3} \frac{3x^2 + 9x}{x^2 - 9} = \lim_{x \to -3} \frac{3x(x+3)}{(x+3)(x-3)} = \lim_{x \to -3} \frac{3x}{x-3} = \frac{3(-3)}{-3-3}$$

$$\frac{3(-3)^2 + 9(-3)}{(-3)^2 - 9}$$

$$\frac{27 - 27}{9 - 9}$$

$$\frac{0}{0}$$

Ind. Form

$\Rightarrow$ More Work

$$= \frac{-9}{-6}$$

$$= \boxed{\frac{3}{2}}$$

2. (5 pts) Evaluate the following limit, if it exists. Clearly indicate $+\infty$ or $-\infty$ in the case of an infinite limit. If the limit does not exist, clearly explain the reason why.

$$\lim_{x \to 4} \frac{\sqrt{x} - 2}{x - 4} \cdot \frac{\sqrt{x} + 2}{\sqrt{x} + 2} = \lim_{x \to 4} \frac{(\sqrt{x})^2 - (2)^2}{(x-4)(\sqrt{x}+2)}$$

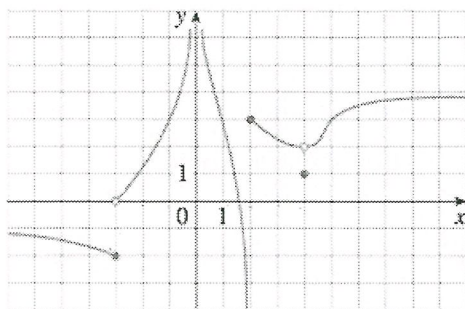$$\frac{\sqrt{4} - 2}{4 - 4}$$

$$\frac{2 - 2}{0}$$

$$\frac{0}{0}$$

Ind. Form

$$= \lim_{x \to 4} \frac{x - 4}{(x-4)(\sqrt{x}+2)}$$

$$= \lim_{x \to 4} \frac{1}{\sqrt{x} + 2}$$

$$= \frac{1}{\sqrt{4} + 2}$$

$$= \frac{1}{2+2} = \boxed{\frac{1}{4}}$$

3. (5 pts) Given the graph of $f(x)$ above, state the value of each quantity below, if it exists. Clearly indicate $+\infty$ or $-\infty$ in the case of an infinite limit. If the quantity does not exist, state DNE.

(a). $\lim\limits_{x \to 2^+} f(x) = \boxed{3}$

(b). $f(-3) = \boxed{-2}$

(c). $\lim\limits_{x \to 4} f(x) = \boxed{2}$

(d). $\lim\limits_{x \to 0} f(x) = \boxed{+\infty}$