Problem 1. Let

$$f(x) = \begin{cases} 3 & x > 9 \\ 6 & x = 9 \\ -x + 11 & -6 \leq x < 9 \\ 17 & x < -6 \end{cases}$$

Find the following limits if they exist (if not, write DNE).

a. $\lim_{x \to 9^-} f(x)$ *b.* $\lim_{x \to 9^+} f(x)$ *c.* $\lim_{x \to 9} f(x)$

d. $\lim_{x \to -6^-} f(x)$ *e.* $\lim_{x \to -6^+} f(x)$ *f.* $\lim_{x \to -6} f(x)$

Problem 2. Evaluate each limit.

a. $\lim_{x \to -1} \frac{x-5}{7x^2-5x+3}$ *b.* $\lim_{a \to 6} \frac{1/a - 1/6}{a-6}$ *c.* $\lim_{y \to 16} \frac{16-y}{4-\sqrt{y}}$

d. $\lim_{x \to 0} \frac{\sqrt{5+x^2}-\sqrt{5-x^2}}{x^2}$ *e.* $\lim_{x \to -6} \frac{2x+12}{|x+6|}$ *f.* $\lim_{x \to \frac{1}{2}^-} \frac{2x-1}{|2x^3-x^2|}$

g. $\lim_{x \to -2} \frac{2-|x|}{2+|x|}$ *h.* $\lim_{x \to 0^-} (\frac{1}{x} - \frac{1}{|x|})$ *i.* $\lim_{x \to 0^+} (\frac{1}{x} - \frac{1}{|x|})$

j. $\lim_{x \to -2} \frac{x+2}{x^3+8}$ *k.* $\lim_{x \to 16} \frac{4-\sqrt{x}}{16x-x^2}$ *l.* $\lim_{h \to 0} \frac{(3+h)^{-1}-3^{-1}}{h}$

m. $\lim_{h \to 0} \frac{1/(x+h)^2 - 1/x^2}{h}$ *n.* $\lim_{h \to 0} \frac{(x+h)^3-x^3}{h}$ *o.* $\lim_{x \to 0} \frac{\sqrt{x+1}-x}{3x}$