

1. (4pts) Find **algebraically** (without using calculator) the following limits.

a. $\lim_{x \rightarrow 0} \frac{\ln(x+1)}{x^2 + \sqrt{2}}$

b. $\lim_{x \rightarrow \pi/2} x \sin^2(3x)$

2. (13pts) Determine first the type of each limit and then compute **algebraically** (without using calculator) the limit if it exists:

a. $\lim_{x \rightarrow -2} \frac{x^2 - 4}{x^2 + 2}$

b. $\lim_{x \rightarrow 1} \frac{x^2 - 3x + 2}{x^2 - 4}$

c. $\lim_{h \rightarrow 0} \frac{(h+3)^2 - 3}{h}$

d. $\lim_{x \rightarrow 1} \frac{\sqrt{x} - 1}{x - 1}$

e. $\lim_{x \rightarrow 0} \frac{\sin(4x)}{x}$ (use the fact $\lim_{\theta \rightarrow 0} \frac{\sin(\theta)}{\theta} = 1$)