NAME: Answer Key **Panther ID:** _____

Quiz 1 MAC-2311 Fall 2016

1. (10 pts) Compute each limit. If the limit does not exist or is infinite specify so (2.5 pts each).

(a) $\lim_{x\to -1} \frac{x^2-2x-3}{3x^2-x^3} = \frac{(-1)^2-2(-1)-3}{3\cdot(-1)^2-(-1)^3} =$ ↑ limit properties

$= \frac{1+2-3}{3+1} = \frac{0}{4} = \boxed{0}$

(b) $\lim_{x\to 3} \frac{x^2-2x-3}{3x^2-x^3} = \frac{0}{0}$

$= \lim_{x\to 3} \frac{(x-3)(x+1)}{-x^2(x-3)}$

$= \frac{4}{-3^2} = -\frac{4}{9}$

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

$= \lim_{x\to+\infty} \frac{x^2}{-x^3} = \lim_{x\to+\infty}\left(-\frac{1}{x}\right) = 0$

↑ Limit Rule

(d) $\lim_{x\to 0} \frac{x^2-2x-3}{3x^2-x^3} = \frac{-3}{0^-}$

$= \lim_{x\to 0} \frac{(x-3)(x+1)}{-x^2(x-3)} =$

$= \frac{1}{0^-} = -\infty$

The denominator is a small negative number

2. (Bonus 2 pts) Write the equations of horizontal or vertical asymptotes (if any) of $f(x) = \frac{x^2-2x-3}{3x^2-x^3}$.

Note that in Pb. 1, you computed some limits of this function.

$y=0$ is a H.A. for both $x\to+\infty$ and $x\to-\infty$

$x=0$ is a V.A. as the limit in (d) shows.

But $x=3$ is not a V.A. (as shown in part (b))