Math 234 B Discussion BD4 Quiz 2 **Name (Last,First):** Solutions

Compute the limit, if it exists. If it does not exist, write "DNE". In either case, include some steps to support your answer.

1.] (2 pts) $\lim_{x\to -1/2} 1-5x^3$ $= 1-5\left(-\frac{1}{2}\right)^3 = 1-5\left(-\frac{1}{8}\right) = 1+\frac{5}{8} = \frac{13}{8}.$

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

3.] (2 pts) $\lim_{x\to\infty} \frac{2x^2+4x+1}{x^2-1}$ $= \lim_{x\to\infty} \frac{2x^2/x^2 + 4x/x^2 + 1/x^2}{x^2/x^2 - 1/x^2}$

$= \lim_{x\to\infty} \frac{2+4/x+1/x^2}{1-1/x^2} = \frac{2+0+0}{1-0} = 2.$

4.] (2 pts) $f(x) = \begin{cases} x^2 & \text{if } x \le 2 \\ 9 & \text{if } x > 2 \end{cases}$

a.) $\lim_{x\to 2^-} f(x)$ $= \lim_{x\to 2^-} x^2 = (2)^2 = 4.$

b.) $\lim_{x\to 2^+} f(x)$ $= \lim_{x\to 2^+} 9 = 9.$

c.) $\lim_{x\to 2} f(x)$ DNE, since the left and right handed limits are not equal.

d.) Is $f(x)$ continuous at $x = 2$? Why or why not?

No, because $\lim_{x\to 2} f(x)$ does not exist.

5.] (2 pts) In some species, the intake of food is affected by the amount of vigilance maintained by the animal while feeding. In one model, if the animal is foraging on plants that offer a bite of size S, the intake rate of food, $I(S)$, is given by a function of the form

$$I(S) = \frac{aS}{S+c}$$

where a and c are positive constants.

What happens to the intake $I(S)$ as bite size S increases indefinitely? (As always, justify your answer)

$$\lim_{S\to\infty} \frac{aS}{S+c} = \lim_{S\to\infty} \frac{aS/S}{S/S+c/S} = \lim_{S\to\infty} \frac{a}{1+c/S}$$

$$= \frac{a}{1+0} = a.$$

The intake approaches the number a.