B4.

MATH 1500: Test #1 (Fall 2008)
Solutions

1. Find the domain of the function $\sqrt{(x+1)(x+2)}$.

Solution. Either (a) $x+1 \geq 0$ and $x+2 \geq 0$ or (b) $x+1 \leq 0$ and $x+2 \leq 0$. Case (a) yields $x \geq -1$ and $x \geq -2$, i.e. the interval $[-1,\infty)$. Case (b) gives $x \leq -1$ and $x \leq -2$, i.e. the interval $(-\infty,-2]$. So, the domain consists of the intervals $[-1,\infty)$ and $(-\infty,-2]$.
[Note: they do not have to express the domain in terms of intervals; any correct solution is fine.]

2. Which of the following functions is even, which is odd, which is neither even not odd?

$$f(x) = x(e^{(x^2)})$$

$$g(x) = \frac{x+x^7}{x^{101}+x^3}$$

$$h(x) = x+1+\frac{1}{x}$$

Solution: $f(-x) = (-x)(e^{((-x)^2)}) = -xe^{(x^2)} = -f(x)$, so $f(x)$ is odd

$g(-x) = \dfrac{(-x)+(-x)^7}{(-x)^{101}+(-x)^3} = \dfrac{(-1)(x+x^7)}{(-1)(x^{101}+x^3)} = \dfrac{(x+x^7)}{(x^{101}+x^3)} = g(x)$, so this one is even.

$h(-x) = -x+1-\dfrac{1}{x}$ and this is neither $h(x)$ nor $-h(x)$. Neither even nor odd.

3. Evaluate the following limits:

(a) $\displaystyle\lim_{x\to 1}\frac{x^2+x}{(x^2-3x-4)}$

(b) $\displaystyle\lim_{x\to -1}\frac{x^2+x}{(x^2-3x-4)}$

Solution.

(a) $\displaystyle\lim_{x\to 1}\frac{x^2+x}{(x^2-3x-4)} = \frac{2}{-6}$ by substituting.

(b) $\displaystyle\lim_{x\to -1}\frac{x^2+x}{(x^2-3x-4)} = \lim_{x\to -1}\frac{x(x+1)}{(x+1)(x-4)} = \lim_{x\to -1}\frac{x}{(x-4)} = \frac{1}{5}$.