Instr.: Woei *May 4, 2006*

Name: Key *Student ID:*

No Calculators.

1. (*6 pts*) Find the Taylor series at $x = 0$ for $x\ln(1+x)$.

Taylor Series for $f(x)=\ln x$ centered at $x=1$ is

$$\sum_{K=0}^{\infty} \frac{f^{(K)}(1)\,(x-1)^K}{K!}$$

where

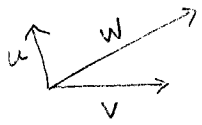
$f'(x) = \frac{1}{x}$ $\quad f''(x) = \frac{-1}{x^2}$ $\quad f'''(x) = \frac{2}{x^3}$

$f^{(n)}(x) = \frac{(n-1)!\,(-1)^{n+1}}{x^n}$

$$\sum_{K=0}^{\infty} \frac{(K-1)!\,(-1)^{K+1}\,(x-1)^K}{K!} = \sum_{K=0}^{\infty} \frac{(-1)^{K+1}(x-1)^K}{K} = \ln x$$

thus $\ln(1+x) = \sum_{K=0}^{\infty} \frac{(-1)^{K+1}x^K}{K}$ and so $x\ln(1+x) = \sum_{K=0}^{\infty} \frac{(-1)^{K+1}x^{K+1}}{K}$

2. (*4 pts*) Copy vectors **u**, **v**, **w** head to tail as needed to sketch the indicated vector.



a. u-v

b. u-v+w