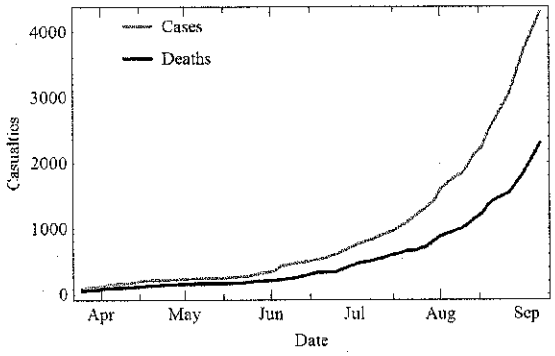
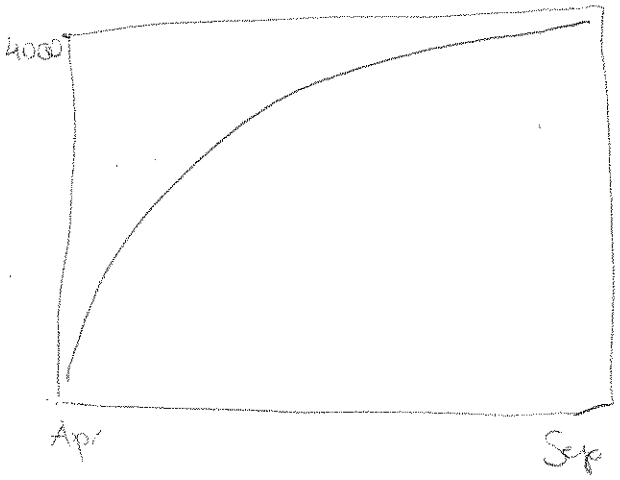
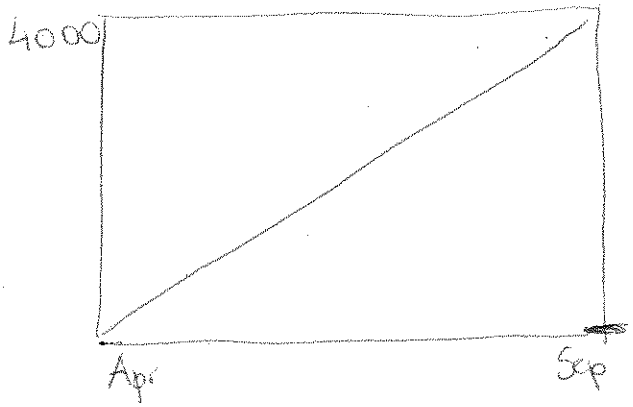
WORKSHEET 6

1. Which is more worrisome?







2. Use L'Hopitals rule to decide whether $f(x)$ or $g(x)$ grows faster or they grow at the same rate!

   - $f(x) = x^2$, $g(x) = x^3 + 3x + 5$,
   - $f(x) = \ln(x)$, $g(x) = x^{0.01}$,
   - $f(x) = x + 100000000000$, $g(x) = x$
   - $f(x) = e^x$, $g(x) = 1000000000000000000x$.

3. Decide whether $f(x) = o(g(x))$, $f(x) = O(g(x))$ or neither.

   - $f(x) = x^2$, $g(x) = e^x$,
   - $f(x) = x^2$, $g(x) = \int_1^x \ln(t)dt$,
   - $f(x) = x^2$, $g(x) = x(10x + 23)$.

—— Turn the page ——

Integral formulas:

- $\int \frac{1}{x} dx = \ln(x) + C$
- $\int e^x dx = e^x + C$
- $\int \sin(x) dx = -\cos(x) + C$
- $\int \cos(x) dx = \sin(x) + C$
- $\int \tan(x) dx = -\ln(\cos(x)) + C = \ln(\sec(x)) + C$
- $\int \cot(x) dx = \ln(\sin(x)) + C$
- $\int \sec^2(x) dx = \tan(x) + C$
- $\int \csc^2(x) dx = -\cot(x) + C$

4. Compute the following integrals. (you need to use u-sub starting from the third bullet)

- $\int_1^2 \frac{2+x^3}{x^2} dx$
- $\int_2^3 \frac{1-x^2}{1-x} dx$
- $\int_0^1 \frac{\sin(x)}{\cos(x)} dx$
- $\int_0^1 \frac{y^3}{\sqrt{1+y^2}} dy$
- $\int_0^1 z^3 \sqrt{1+z^2} dz$
- $\int_1^e \frac{\ln^3 t}{t} dt$
- $\int 2^x dx$ (Hint: write $2^x = e^{x \ln 2}$ and use a u-sub)

5. Hard one: Only counting additions computing the determinant of an $n \times n$ matrix by definition involves $n! = n(n-1)(n-2)...$ operations. Using Gauss elimination one needs $n^2(n+1)/2$ operations. For a large matrix (when n is big) which method would you use? (i.e $n!$ or $n^2(n+1)/2$ grows faster?)