Math 1B
Post Midterm 3 Review and Final Exam Comments

Use the study guides from midterms 1, 2 and 3 to review chapters 4, 5 and 6 (not including 6.6 – see below).

Also, make sure you can do all the derivatives and integrals on the hyperbolic supplement. (You must memorize the identities and derivatives of the hyperbolic and inverse hyperbolic functions. The easiest way to do this is to notice which ones are the same as for trigonometric functions, and which are different **and how**.)

The following questions act as a review for 6.6, 7.2 and 7.3.

[1] Determine if the following integrals converge or diverge. If an integral converges, find its value.

[a] $\int_0^\infty x^2 e^{-3x}\,dx$ [b] $\int_0^\infty \frac{1}{\sqrt[3]{x-1}}\,dx$ [c] $\int_{-\infty}^\infty \frac{1}{x^2+4}\,dx$ [d] $\int_{-\infty}^\infty \frac{x}{x^2+4}\,dx$

[e] $\int_{-\infty}^0 \frac{e^x}{1+e^x}\,dx$ [f] $\int_0^2 \frac{1}{\sqrt{4-x^2}}\,dx$ [g] $\int_0^2 \frac{x}{\sqrt{4-x^2}}\,dx$ [h] $\int_0^1 \frac{1}{x(\ln x)^2}\,dx$

[i] $\int_0^\pi \tan x\,dx$

[2] Determine if the following integrals converge or diverge. Justify your answer.

[a] $\int_1^\infty \frac{2+\sin x}{x}\,dx$ [b] $\int_1^\infty \frac{2+\sin x}{x^2}\,dx$ [c] $\int_0^\infty e^{-x^2 dx}$ [d] $\int_e^\infty \frac{1}{\ln x}\,dx$

[e] $\int_e^\infty \frac{1}{x\ln x}\,dx$ [f] $\int_2^\infty \frac{x+1}{\sqrt{x^4-1}}\,dx$ [g] $\int_1^\infty \frac{\cos^2 x}{xe^x}\,dx$

[3] Solve the following initial value problems.

[a] $\frac{dy}{dx} = \frac{2y}{x^3}$, $y(1)=1$ [b] $\frac{dy}{dx} = \frac{1+y^2}{\cos^2 x}$, $y(0)=1$

[c] $\frac{dy}{dx} = e^{2x+y}$, $y(0)=1$ [d] $\frac{dy}{dx} = \frac{1}{x^2 y}$, $y(1)=4$

[4] Use Euler's method to approximate the value of $y(2)$ for each initial value problem using the specified value of h.

[a] $\frac{dy}{dx} = x+y^2$, $y(1)=1$, $h=0.5$ WITHOUT USING A CALCULATOR

[b] $\frac{dy}{dx} = \cos x + \sin y$, $y(0)=0$, $h=0.2$

[c] $\frac{dy}{dx} = x^2 - 2y^2$, $y(0)=0$, $h=0.1$

The final exam will be approximately 50% multiple choice, with no partial credit for those problems (since you won't have to show work). There will be a no-calculator section and a calculator-allowed section.
The questions on volume, work and hydrostatic force will all be on the multiple choice calculator-allowed section. You will be expected to simply set up the integrals, then use fnInt to find the correct answer. That means **you must be able to set up the integrals correctly**, and **you must be able to use your calculator correctly**.

REMEMBER: I MUST SEE YOUR ID BEFORE YOU CAN TAKE THE FINAL EXAM.