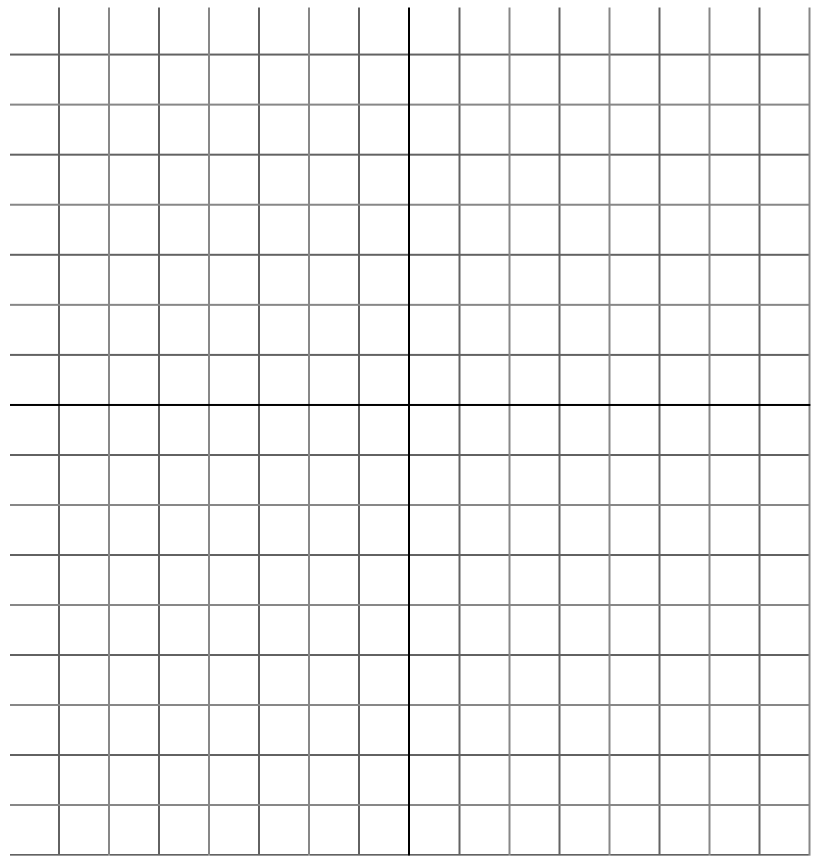
SI Session: Final Exam Review
Wednesday, August 13th
12:35 PM – 3:35PM
Room 1229

Prof. Stockton : Calculus II
Summer II 2008
SI Leader : Neil Jody

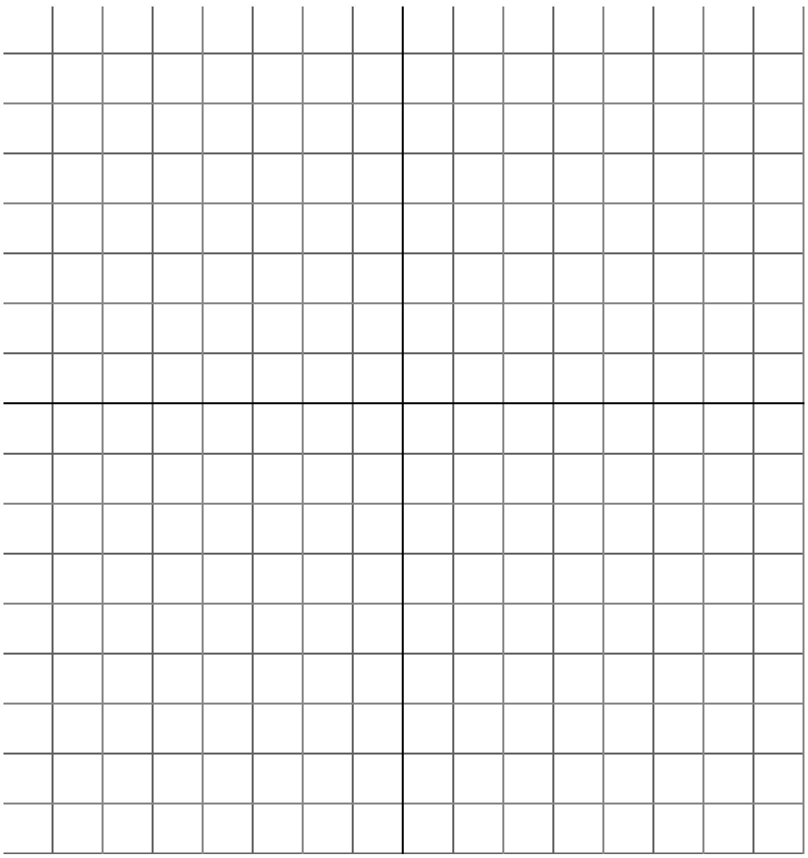
[1] Let R denote the region in the xy-plane bounded by the graphs of $y = \ln x$, $y = 1$, and $y = 1 - x$. For each of the following, write down an integral representing the volume of the solid obtained by revolving R about the indicated line:

(a) the x-axis (b) the y-axis (c) the line $x = -2$
(d) the line $y = 2$ (e) the line $x = 4$ (f) the line $y = -1$



[2] Let C be the portion of the graph of $y = \cos x + 2$ corresponding to $\frac{\pi}{2} \le x \le \pi$. Write down an integral representing each of the following:

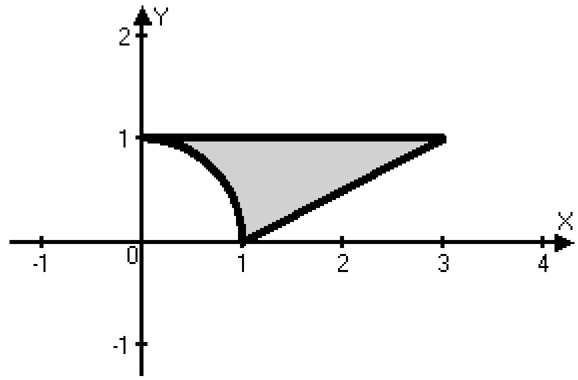
(a) the length of C
(b) the area of the surface obtained by revolving C about the x-axis
(c) the area of the surface obtained by revolving C about the y-axis
(d) the area of the surface obtained by revolving C about the line $x = 4$
(e) the area of the surface obtained by revolving C about the line $y = 3$
(f) the area of the surface obtained by revolving C about the line $x = -2$
(g) the area of the surface obtained by revolving C about the line $y = -1$



[3] Let R denote the region in the xy-plane bounded by the graphs of the following equations:

$x-2y=1$, $y=\sqrt{1-x^2}$, and $y=1$ (see figure)

Write down an integral that represents the *area* of R.



[4] Differentiate the following with respect to x.

(a) $y=\dfrac{1}{\tan^{-1}x}$

(b) $y=\sec\left[\sin^{-1}(x-1)\right]$

[5] $\int \frac{1}{x\sqrt{1-(\ln x)^2}}\,dx$

[6] Evaluate the limit.

(a) $\lim_{x\to\infty}\left(5+2e^{2x}\right)^{e^{-2x}}$

[7] Evaluate each integral.

(a) $\int \cos^4 x dx$

(b) $\int \tan^4 x\, dx$

(c) $\int e^{2x} \cos 3x\, dx$

(d) $\int x^3 \ln x\, dx$

(e) $\int \frac{x}{x^2 - 6x + 5} dx$

(f) $\int \frac{\sqrt{1 - 4x^2}}{x} dx$

[8] Determine if each of the following improper integrals converges or diverges.
If it converges, state its value.

(a) $\displaystyle\int_3^4 \frac{1}{(x-3)^{4/3}}\,dx$

(b) $\displaystyle\int_0^\infty \frac{1}{4+x^2}\,dx$

[9] Determine if each series is *absolutely* convergent, *conditionally* convergent, or divergent. Indicate the onvergence tests used

(a) $\sum_{n=1}^{\infty}(-1)^n \frac{(n!)^2}{(3n)!}$

(b) $\sum_{n=1}^{\infty}\frac{\ln n}{n^2}$

[10] Find a power series representation for $f(x) = x^3 \arctan(2x)$ using the Maclaurin series for arctan*x*.

[11] Find the third degree Taylor polynomial for the function $f(x) = \sqrt{x}$ centered at $x = 9$.

[12] Determine the convergence or divergence of the sequence with the given *n*th tern.
If the sequence converges find its limit.

(a) $a_n = \dfrac{\ln\sqrt{n}}{n}$

(b) $a_n = 2^{1/n}$

[13] Find the interval of convergence of the power series $\displaystyle\sum_{n=1}^{\infty} \frac{2^n}{n}(x-1)^n$.

[14] Find a rectangular equation for the curve whose parametrization is given.

(a) $x = t^2 - 1,\ y = 2t - 1$

(b) $x = 3\cos t,\ y = 2\sin t$

(c) $x = \ln t,\ y = t^2$

[15] Parametrize the curve whose description is given.

(a) the line $2x + 5y = 1$

(b) the circle $(x-1)^2 + y^2 = 4$

[16] Convert each equation to polar form.

(a) $x^2 + y^2 - 2x = 0$

(b) $y = 3$

[17] Convert each equation to rectangular form.

(a) $r = \sin\theta$

(b) $r = 5$