Calculus II / Final Exam Review Sheet

1. The following topics will be on this exam: volumes of solids of revolution, L'Hôpital's Rule/Indeterminant Forms, Improper Integrals, Sequences, Series (all - Taylor/Mac/Power/Rad. of Conv/Int. of Conv/Manipulation of ...), u-substitution, integ. by parts, tables, partial fractions, complete the □ & polar coord. material from Appendix H that we cover.

2. Integrate: a) $\int \sec^2(4t)\tan^2(4t)\,dt$ b) $\int \frac{x^3+1}{x^3+x}\,dx$
   c) $\int \frac{3}{x^2-4x+5}\,dx$ d) $\int \frac{1-\sqrt{x}}{x}\,dx$ e) $\int \frac{e^{2x}}{1+e^{2x}}\,dx$
   f) $\int x\tan^{-1}x\,dx$ g) $\int \frac{x^2}{(1-x)(1+x)(1+x^2)}\,dx$

3. Use the reduction formula below to find $\int \cos^5 x\,dx$.
$$\int \cos^m x\,dx = \frac{\cos^{m-1}x\,\sin x}{m} + \frac{m-1}{m}\int \cos^{m-2}x\,dx$$

4. Text, p 410 #8, #16, #20

5. Use the Maclaurin Series for $\frac{1}{1-x}$ to obtain the Maclaurin Series for $f(x) = \frac{x^2}{1+(2x)^4}$. For what values of x does this converge?

6. Use a known series to help write a Maclaurin Series for $f(x) = \frac{1-\cos(x^2)}{x^4}$. For what values of x does this converge?

7. Use series to approximate $\int_0^1 \sin(x^4)\,dx$ to 3-place decimal accuracy.

8. Use series to approximate $\int_0^1 e^{-x^3}\,dx$ to 2-place decimal accuracy.

9. Find the rectangular coordinates of each point whose polar coordinates are given by: a) $P(4, 3\pi)$ b) $Q(-2, -\frac{5\pi}{6})$

10. Find the polar coordinates satisfying the stated conditions for the point whose rectangular coordinates are $(-2, 2)$
    a) $r > 0$ & $0 \le \theta \le 2\pi$ b) $r < 0$ & $0 \le \theta < 2\pi$

11. Sketch the following polar curves. Indicate any key points.
    a) $r = 1 - \sin\theta$ b) $r = \sin 2\theta$

12. Represent the area enclosed by one petal of the rose curve in 11b) by a definite integral. Do <u>not</u> evaluate the integral.