REVIEW QUESIONS FOR EXAM 1

MATH 230, Section BL1, Fall 2005

Evaluate the following indefinite integrals:

$$I_1 = \int \frac{\sin(2x)}{4+\cos(2x)}\,dx$$

$$I_2 = \int \frac{x}{\sqrt{\exp(2x^2)-1}}\,dx$$

$$I_3 = \int \sin(\ln t)\,dt$$

$$I_4 = \int \ln(1+x^2)\,dx$$

$$I_5 = \int \sin^2(2x)\,\cos^2(2x)\,dx$$

$$I_6 = \int \tan^2(2t)\,\sec^4(2t)\,dt$$

$$I_7 = \int \frac{x^2+4}{(x^2+1)^2\,(x^2+2)}\,dx$$

$$I_8 = \int \frac{x^4}{x^2+4\,x+4}\,dx$$

$$I_9 = \int \frac{1}{x^2\,\sqrt{x^2-25}}\,dx$$

$$I_{10} = \int \frac{x^3-2\,x}{x^2+2x+2}\,dx$$

$$I_{11} = \int (x-x^2)^{3/2}\,dx$$

Determine whether the integrals below converge or diverge. If they converge, evaluate them.

$$I_{12} = \int_3^\infty \frac{1}{\sqrt{x+1}}\,dx$$

$$I_{13} = \int_0^4 \frac{1}{\sqrt{4-x}}\,dx$$

Solutions:

1. $-\frac{1}{2}\,\ln|4+\cos(2\,x)|+c$
2. $\frac{1}{2}\,\arctan\left(\sqrt{\exp(2\,x^2)-1)}\right)+c$
3. $\frac{t}{2}\,(\sin(\ln t)-\cos(\ln t))+c$
4. $x\,\ln(1+x^2)-2\,x+2\,\arctan x+c$
5. $\frac{x}{8}-\frac{\sin(8\,x)}{64}+c$
6. $\frac{(\tan(2\,t))^3}{6}+\frac{(\tan(2\,t))^5}{10}+c$
7. $-\frac{\arctan x}{2}+\sqrt{2}\,\arctan\left(\frac{x}{\sqrt{2}}\right)+\frac{3}{2}\,\frac{x}{x^2+1}+c$
8. $\frac{x^3}{3}-2\,x^2+12\,x-32\,\ln|x+2|-\frac{16}{x+2}+c$
9. $\frac{\sqrt{x^2-25}}{25\,x}+c$
10. $\frac{x^2}{2}-2\,x+4\,\arctan(x+1)+c$
11. $\frac{3}{128}\sin^{-1}(2\,x-1)+\frac{1}{64}\sqrt{x-x^2}\,(2\,x-1)\,(3-8\,x^2+8\,x)+c$
12. diverges
13. 4