Evaluate the following integrals, and *check your answers!!*

1. $\displaystyle\int \frac{1}{\sqrt{1-x}}\,dx \qquad (u = 1-x)$

2. $\displaystyle\int x\sin(\pi x^2)\,dx \qquad (u = \pi x^2)$

3. $\displaystyle\int_1^3 \frac{x}{1+x^2}\,dx \qquad (u = 1+x^2)$

4. $\displaystyle\int \frac{x}{1+x^4}\,dx \qquad (u = x^2)$

5. $\displaystyle\int_2^5 \frac{1}{x\ln(x)}\,dx \qquad (u = \ln(x))$

Evaluate the following integrals, and check your answer by differentiation.

1. $\displaystyle\int 2x \cos(x^2)\, dx$

2. $\displaystyle\int x^2 \sin(x^3)\, dx$

3. $\displaystyle\int 7e^{4x}\, dx$

4. $\displaystyle\int \sin(x)\left(\cos(x)\right)^2\, dx$

5. $\displaystyle\int \frac{\ln(x)}{x}\, dx$

6. $\displaystyle\int \sec(x)\tan(x)\, dx$

7. $\displaystyle\int \sec(x)\tan(x)e^{\sec(x)}\, dx$

8. $\displaystyle\int \frac{\sin(\sqrt{x})}{\sqrt{x}}\, dx$

9. $\displaystyle\int \tan(x)\left(\sec(x)\right)^2\, dx$

10. $\displaystyle\int \frac{x^5 + x - 2}{x^6 + 3x^2 - 12x + 3}\, dx$

11. $\displaystyle\int \frac{e^x}{1 + e^{2x}}\, dx$

12. $\displaystyle\int \frac{x}{1 + x^2}\, dx$