U-Substitution Problems

1. Midterm 1 (Perkins). Compute the integral:

$$\int \frac{3x^2}{\sqrt{2-x}}\,dx$$

2. Midterm 1 (Chen). Evaluate

$$\int_1^2 x\sqrt{2x-1}\,dx.$$

3. Midterm 1 (Burdyz). Compute the integral

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

4. Midterm 1 (Burdyz). Compute

$$\int_0^{\sqrt{\pi}} \frac{x \sin(x^2)}{1 + \left(\cos(x^2)\right)^2}\, dx.$$