Math 8 Practice Exam Problems

Disclaimer: This set of problems is meant neither to indicate the length nor composition of the actual exam. Many are taken from earlier exams or practice exams. However, they may give an indication of the type of problems which will appear on the exam.

1. $\int (2x+1)(x^2+x+3)\,dx$
2. $\int \cos\sqrt{x}\,dx$
3. $\int \dfrac{\cot\theta}{1+\sin^2\theta}\,d\theta$
4. $\int \dfrac{x^2\,dx}{\sqrt{x^2-1}}$
5. Two of the following three integrals are easy to integrate; one is hard. Do the easy ones: $\int \dfrac{x}{1+x^4}\,dx$, $\int \dfrac{x^2}{1+x^4}\,dx$, $\int \dfrac{x^3}{1+x^4}\,dx$.
6. Find the general solution to the differential equation $y' - 2xy = x$.
7. Find the general solution to the differential equation $y'' - y' - 6y = 0$.
8. Into a 5000 liter container is placed 1000 liters of a brine solution containing 20 kg of salt. A brine solution containing .03 kg/l of salt flows into the container at a rate of 20 l/min. Pure water also flows into the container at a rate of 10 l/min. The solution is kept thoroughly mixed, and drains from the container at a rate of 30 l/min. Find and solve the differential equation which describes this system.
9. Consider the region bounded by the graph of $y = \sin(6x)$, the x-axis, $x = 0$ and $x = c$ where c is the first point on the positive x-axis which intersects $y = \sin(6x)$. Find the volume obtained by rotating this region about both the x- and y- axes.