Key Problems

Problem 1.
Solve the differential equations:

a) $y' = 3t^2 + 2$ b) $ty' = 1$ c) $y' = t\sqrt{t^2+1}$

Problem 2.
Solve the differential equations:

a) $y' = 5y$ b) $y' = y^2 t$ c) $y' = 5y(1 - y/10)$

Problem 3.
Solve the differential equations:

a) $y' + 3y = 6$ b) $y' - 2ty = 4t$ c) $y' + 2y = e^t$

Problem 4.
Solve the exact differential equations:

a) $3t^2 - 2t + 2y \cdot y' = 0$ b) $2y - 3t^2 + 2(y+t)y' = 0$ c) $\dfrac{y(1-2\ln t)}{t^3} + \dfrac{\ln t}{t^2} \cdot y' = 0$

Exercise problems

Problems from the textbook:	[E] 7.1 - 7.23
Exam problems:	[Final exam 11/2019] Q3ab

Answers to Key Problems

Problem 1.
a) $y = t^3 + 2t + C$ b) $y = \ln|t| + C$ c) $y = \frac{1}{3}(t^2+1)\sqrt{t^2+1} + C$

Problem 2.
a) $y = Ke^{5t}$ b) $y = -2/(t^2 + 2C)$ c) $y = 10 \cdot Ke^{5t}/(1 + Ke^{5t})$

Problem 3.
a) $y = 2 + Ce^{-3t}$ b) $y = -2 + Ce^{t^2}$ c) $y = \frac{1}{3}e^t + Ce^{-2t}$

Problem 4.
a) $y = \pm\sqrt{t^2 - t^3 + C}$ b) $y = -t \pm \sqrt{t^2 + t^3 + C}$ c) $y = \dfrac{Ct^2}{\ln t}$