Integration Practice

You can use your Calculus book to help you integrate the following. Remember that a general antiderivative has a constant!

1.
$$\int \frac{3x}{2 - x^2}\, dx$$

2.
$$\int \cos^2(3r)\sin(3r)\, dr$$

3.
$$\int e^{-t}\sin(t)\, dt$$

4.
$$\int \frac{1}{x^2 - 4}\, dx$$

5.
$$\int \frac{\sin(x)}{\cos(x)}\, dx$$

6.
$$\int \frac{1}{w^2 + 1}\, dw$$

7.
$$\int \frac{dx}{x\ln(x)}$$

8.
$$\int \frac{x + 5}{x^2 + x - 2}\, dx$$

9.
$$\int \frac{\sqrt{x - 2}}{x + 2}\, dx$$

10.
$$\int t^3 e^{-2t}\, dt$$

11.
$$\int e^{x + e^x}\, dx$$

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

13.
$$\int \frac{dx}{a^2 - x^2}\, dy$$

14.
$$\int x\sqrt[3]{x + c}\, dx$$

Recognition Problems

For each problem, state the method you would use to solve it. Do not actually do so. Your choices are: Separation of Variables, Integrating Factor, or Neither. Some equations may have more than one option.

1. $x' = -2x$

2. $x' = 3t - 2x$

3. $x' = t^2\sin(x)$

4. $x' = \frac{1}{3}e^{-\frac{k}{m}t}$

5. $x' + t^2 x = 4$

6. $x'' = 3t^2 - \cos(t)$

7. $x' = t^2 + \sin(x)$

8. $p' = p^2 - 3p + 2$

9. $y' = \sin(y + 2)$

10. $x' + \sin(t)x = 0$