1. a. The solution to the initial value problem is $y(t) = 20e^{0.3t}$. Below is a table for the Euler's solution.

$t_0 = 0$	$y_0 = 20$
$t_1 = 0.2$	$y_1 = 21.2$
$t_2 = 0.4$	$y_2 = 22.472$
$t_3 = 0.6$	$y_3 = 23.8203$
$t_4 = 0.8$	$y_4 = 25.2495$
$t_5 = 1$	$y_5 = 26.7645$

The solution at $t = 1$ is $y(1) = 26.9972$, so the percent error between Euler's method and the actual solution is -0.86%.

b. The solution to the initial value problem is $y(t) = \frac{100}{3} - \frac{70}{3}e^{-0.3t}$. Below is a table for the Euler's solution.

$t_0 = 0$	$y_0 = 10$
$t_1 = 0.2$	$y_1 = 11.4$
$t_2 = 0.4$	$y_2 = 12.716$
$t_3 = 0.6$	$y_3 = 13.9530$
$t_4 = 0.8$	$y_4 = 15.1159$
$t_5 = 1$	$y_5 = 16.2089$

The solution at $t = 1$ is $y(1) = 16.0476$, so the percent error between Euler's method and the actual solution is 1.0%.

2. a. The solution to the initial value problem is $P(t) = 20 + 80e^{0.1t}$. The solution at $t = 1$ is $P(1) = 108.41$.

b. Below is a table for the Euler's solution.

$t_0 = 0$	$P_0 = 100$
$t_1 = 0.2$	$P_1 = 101.6$
$t_2 = 0.4$	$P_2 = 103.232$
$t_3 = 0.6$	$P_3 = 104.897$
$t_4 = 0.8$	$P_4 = 106.595$
$t_5 = 1$	$P_5 = 108.326$

The percent error between Euler's method and the actual solution is -0.077%.

3. a. If $T(t) = 25 - t + 25e^{-0.2t}$, then $T'(t) = -1 - 5e^{-0.2t}$. However, $-k(T(t) - (20 - t)) = -0.2((25 - t + 25e^{-0.2t}) - (20 - t)) = -0.2(5 + 25e^{-0.2t}) = -1 - 5e^{-0.2t}$. Since $T(0) = 25 + 25e^{-0.2(0)} = 50$, we have verified that we have the correct solution. $T(2) = 39.76°\text{C}$.

b. Below is a table for the Euler's solution.

$t_0 = 0$	$T_0 = 50$
$t_1 = 0.5$	$T_1 = 47$
$t_2 = 1$	$T_2 = 44.25$
$t_3 = 1.5$	$T_3 = 41.725$
$t_4 = 2$	$T_4 = 39.4025$

The percent error between Euler's method and the actual solution is -0.90%.

4. a. If $T(t) = 20 - t + 20e^{-0.2t}$, then $T'(t) = -1 - 4e^{-0.2t}$. However, $-k(T(t) - (15 - t)) = -0.2((20 - t + 20e^{-0.2t}) - (15 - t)) = -0.2(5 + 20e^{-0.2t}) = -1 - 4e^{-0.2t}$. Since $T(0) = 20 + 20e^{-0.2(0)} = 40$, we have verified that we have the correct solution. $T(2) = 31.41°\text{C}$.

b. Below is a table for the Euler's solution.

$t_0 = 0$	$T_0 = 40$
$t_1 = 0.5$	$T_1 = 37.5$
$t_2 = 1$	$T_2 = 35.2$
$t_3 = 1.5$	$T_3 = 33.08$
$t_4 = 2$	$T_4 = 31.122$

The percent error between Euler's method and the actual solution is -0.91%.

5. a. Below is a table for the Euler's solution.

$t_0 = 0$	$R_0 = 10$
$t_1 = 1$	$R_1 = 9.65$
$t_2 = 2$	$R_2 = 9.3145$
$t_3 = 3$	$R_3 = 8.9929$

b. If $R(t) = 5e^{-0.05t} + 5e^{-0.02t}$, then $R'(t) = -0.25e^{-0.05t} - 0.1e^{-0.02t}$. However, $-0.05R(t) + 0.15e^{-0.02t} = -0.05(5e^{-0.05t} + 5e^{-0.02t}) + 0.15e^{-0.02t} = -0.25e^{-0.05t} - 0.1e^{-0.02t}$. Since $R(0) = 5e^{-0.05(0)} + 5e^{-0.02(0)} = 10$, we have verified that we have the correct solution. $R(3) = 9.0124$, so the percent error between Euler's method and the actual solution is -0.22%.