# Mathematics 172 Homework

**1.** Solve the initial value problem for the rate equation
$$P' = -.4(P - 200), \qquad P(0) = 180$$
by doing the substitution $y = P - 200$.
  *Answer:* $P(t) = 200 - 20e^{-.4t}$.

**2.** Solve the initial value problem
$$\frac{dN}{dt} = .3(N - 75), \qquad N(0) = 80.$$
  *Answer:* $N(t) = 75 + 5e^{.3t}$.

**3.** Solve the initial value problem
$$P' = -.2P + 600, \qquad P(0) = 2{,}800.$$

  *Answer:* We have to work on this one a bit to see what substitution to do. Factor out the $-.2$ to get
$$P' = -.2\,(P - 3{,}000)\,.$$
So the correct substitution is $y = P - 3{,}000$. You can now solve and get
$$P = 3{,}000 - 200e^{-.2t}.$$

**4.** Solve
$$N' = -.13N + 500 \qquad N(0) = 4{,}000.$$
  *Answer:* $N(t) = 3846.15 + 153.85e^{-.13t}$