

## Notes

**Examples**

**Example 1.** Find the general solution to the differential equation

$$(x - 4)y' + y = x^2 + 20.$$

**Example 2.** A 500-gallon tank initially contains 200 gallons of brine containing 80 pounds of dissolved salt. Brine containing 3 pounds of salt per gallon flows into the tank at the rate of 4 gallons per minute, and the well-stirred mixture flows out of the tank at the rate of 1 gallon per minute. How much salt is in the tank when it is full?

**Example 3.** You have an oversized trench coat and decide that its best use is to sell chocolate bars. The trench coat is capable of holding 80 chocolate bars, and you currently have 50. Using your mad 16020 math skills, you have determined that you sell the chocolate bars at a daily rate equal to 14% of the available chocolate bar-capacity of your trench coat. When will you sell out of chocolate bars?

**Example 4.** Aliens are invading West Lafayette at an alarming rate of

$$y' = ty + t$$

aliens per day, after an initial invasion of 40 aliens. How long will it take the alien population to grow to 750?