Review Midterm II

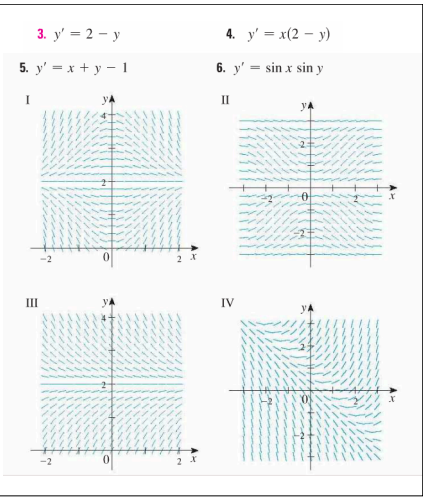
7.2-5

3. $y' = 2 - y$

4. $y' = x(2 - y)$

5. $y' = x + y - 1$

6. $y' = \sin x \sin y$



7.2.23

23. Use Euler's method with step size 0.1 to estimate $y(0.5)$, where $y(x)$ is the solution of the initial-value problem $y' = y + xy$, $y(0) = 1$.

7.3.45

45. A tank contains 1000 L of brine with 15 kg of dissolved salt. Pure water enters the tank at a rate of 10 L/min. The solution is kept thoroughly mixed and drains from the tank at the same rate. How much salt is in the tank (a) after t minutes and (b) after 20 minutes?

7.4.13

13. A roast turkey is taken from an oven when its temperature has reached 185°F and is placed on a table in a room where the temperature is 75°F.
(a) If the temperature of the turkey is 150°F after half an hour, what is the temperature after 45 minutes?
(b) When will the turkey have cooled to 100°F?

- Graph the curve and find its exact length
- $x=e^t-t$, $y=4e^{t/2}$, $-8 \le t \le 3$.

- 6.6-9 A spring has a natural length 20cm. Compare the work W1 done in stretching the spring from 20cm to 30cm with the work W2 don in stretching 30cm to 40cm. How are W1 and W2 related.

Force: f(x)=kx
k depends on spring
x distance from natural

- 6.6-11. A heavy rope, 50ft long, weights 0.5lb/ft and hangs over the edge of a building 120 ft heigh.
  - a. How much work is done in pulling the rope to the top of the building?
  - b. How much work is done in pulling half of the rope to the top of the

W=Force. (b-a) (for a moving from a to b)
Divide rope in pieces where you can apply the formula.

- In a certain city, the temperature (in F) t hours after 9AM was modeled by the function T(t) =50+14.sin(πt/12). Find the average temperature during the period from 9 am to 9pm

Average of function f on [a,b]

$$\frac{\int_a^b f(x)\,dx}{b-a}$$

- 7.1-9

9. A population is modeled by the differential equation

$$\frac{dP}{dt} = 1.2P\left(1 - \frac{P}{4200}\right)$$

(a) For what values of P is the population increasing?
(b) For what values of P is the population decreasing?
(c) What are the equilibrium solutions?

Note tha P is always ≥ 0.

a. For the values of P for which dP/dt>0 (
b. For the values of P for which dP/dt<0.
c. These are the constant solutions so their derivative is 0. Thus P(t)=0 and P(t)=4200.

Recall: Rotate curve (x,f(x)), x in [a,b] (on the first quadrant) about y axis. The volume is

- Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the given curves about the y-axis. Sketch the region and a typical shell.
- $y=3+2x-x^2$, $x+y=3$.