

Problem Set 7

1. Evaluate the following integrals:
 - a) $\int (x^4 + 2x^3 + 4x + 10) dx$
 - b) $\int x^{2/3} dx$
 - c) $\int 10e^x dx$
 - d) $\int (3x^2 + 2) / (x^3 + 2x) dx$

2. Solve the following differential equations and ensure the initial conditions are satisfied:

- a) $\dot{y} - y = 0$ and $y(0) = 1$
- b) $\dot{y} + 3y = 12$ and $y(0) = 10$
- c) $2\dot{y} + \frac{1}{2}y = 12$ and $y(0) = 10$
- d) $\dot{y} = 5$ and $y(0) = 1$
- e) $\dot{y} = 6y - 6$ and $y(0) = 3$

3. Suppose that the change in the quantity sold of a particular stock depends on the gap between the offer price p^D and the asking price p^S :

$$\dot{q} = \alpha (p^D - p^S)$$

The inverse demand function of the buyers is:

$$p^D = a + bq$$

and the inverse supply function of the sellers is:

$$p^S = g + hq.$$

If the initial price is p^0 at $t = 0$, find the equilibrium quantity sold in this market and find the expression showing quantity sold as a function of time. What conditions on the parameters of the inverse demand and supply curves must hold for the equilibrium to be stable?