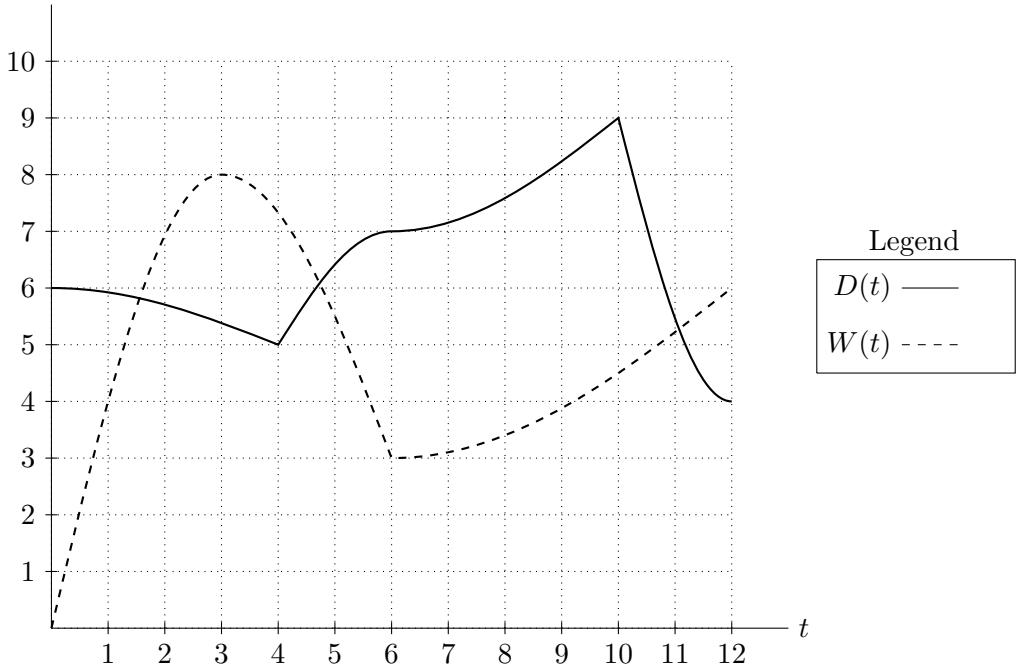
4. [9 points] A Swiss bank is constantly receiving deposits and withdrawals of money. Let $D(t)$ be the deposit rate (the rate at which money is going into the bank) and $W(t)$ be the withdrawal rate (the rate at which money is being taken out of the bank), both in millions of dollars/month, where t is measured in months since January 1st 2013. Suppose that on January 1st 2013 the bank has \$50 million. A graph of the two functions is shown below.



a. [4 points] Write an expression that gives the amount of money in the bank at time t. Include units.

Solution: $M(t) = \int_0^t (D(x) - W(x))dx + 50$ million dollars.

Alternatively $M(t) = 10^6 \int_0^t (D(x) - W(x)dx) + 5 * 10^7$ dollars

b. [3 points] Write an expression that gives the average rate of change of the amount of money in the bank, in millions of dollars per month, during the year 2013.

Solution: $\frac{1}{12} \int_0^{12} (D(t) - W(t))dt.$

c. [2 points] Estimate the date in 2013 when the bank has the most money in it. You do not need to show your work.

Solution: $t \approx 11$ or approximately December 1st 2013.