

## AP Calculus

### Extra Practice Rate in/out

A checking account has \$120,000 at time  $t=0$ . During the interval  $0 \leq t \leq 18$  months, money is deposited into the checking account at a rate  $d(t) = 2,000(t+1)\sin\left(\frac{t}{4}\right)$  dollars/month. At the same time, money is withdrawn from the checking account at the rate  $w(t) = \frac{10,000}{t+1}$  dollars/month.

- Is the dollar amount increasing at  $t=9$  months? Explain.
- How many dollars are in the account at time  $t=18$  months? Round to the nearest hundredth.
- When is the **rate** at its maximum over 18 months? Justify.
- Find the average amount of money deposited monthly to the account from  $t = 0$  to  $t = 18$  months.

### Answers

- $d(9) - w(9) = \$14,561.464$  dollars/month; Dollar amount is increasing since  $d(9) - w(9) > 0$
- \$99,315.61
- Check endpoints and critical points  
 $t = 0$ ;  $-\$10,000$  dollars/month  
 $t = 18$ ;  $-\$37,672.46$   
 $t = 8.047$ ;  $\$15,257.88$  dollars/month  
The rate is at a maximum at  $t = 8.047$  months
- \$486.67