

## Problem

Moe's revolutionary "oreo design" hotel has become so successful that his VBA-powered MSFT Access CRS is having trouble handling the transaction volume coming at it when both of his room service / sales agents (Huey and Looney) take calls at the same time. The system doesn't have any logging and doesn't store enough info to count transactions, but Joe found a way to sample counts of transactions per hour throughout the day. Using his Colorado City HS AP Stats training, Joe estimated a polynomial regression model from the data and came up with the following model for the rate of incoming transactions per hour (in thousands) as a function of time over the period when Huey and Looney answer the phone (between 2 and 6 in the afternoon):

$$r(t) = -t^2 + 8t - 12$$

where  $t$  is measured in hours starting at  $t = 2$  and ending at  $t = 6$ . How many total transactions should Moe expect to receive between 2 and 6?

## Solution

$$\int_2^6 -t^2 + 8t - 12 dt = \left[ -\frac{t^3}{3} + 4t^2 - 12t \right]_2^6 = 32/3 \text{ thousand transactions.}$$