We Got Portals Co.

#1) We Got Portals Company finds that its cost function is $C(x) = 60{,}000\sqrt{x} - 4000\sqrt[3]{x}$ dollars, where x is the daily production of magical portals.

   a.   Find the marginal cost function.
   b.   Find the marginal cost when 8 portals have been produced.
   c.   Interpret your answer from part b.

Portal Remover Inc.

#2) Portal Remover Inc. finds that its revenue function is $R(x) = 3000\sqrt[3]{x} + 64\sqrt{x}$ dollars, where x is the daily sales of portal removers.

   a.   Find the marginal revenue function.
   b.   Find the marginal revenue when 64 portal removers have been sold.
   c.   Interpret your answer from part b.

Portal Med Supply

#3) Portal Med Supply find that its total profit from selling x vomit bags is $P(x) = 0.02x^{3/2} - 1500$ dollars.

    a.   Find Portal Med Supply's marginal profit function.

    b.   Find the marginal profit when 5,000 vomit bags have been sold.

    c.   Interpret your answer from part b.

Portal Research and Development Labs

#4) Portal Research and Development Labs finds that the population of a city will be $P(x) = 12{,}000 - 12x + 6000x^2 + 10x^{-3}$ people x years after portal technology enters the city.

    a.   Find the rate of change of population x years after portal tech enters the city.

    b.   Find the rate of change 2 years from now.

    c.   Interpret your answer from part b.

    d.   Find the rate of change 10 years from now.

    e.   Interpret your answer from part d.

Turtle Flu

#5) The number of Mario Brothers that have been newly infected on day t of a turtle flu epidemic is $f(t) = 25t^2 - 3t^3$ for $0 \leq t \leq 5$.

    a. Find the number of newly infected Brothers on day 2.

    b. Interpret your answer from part a.

    c. Find the instantaneous rate of change on day 2.

    d. Interpret your answer from part c.

Turtle Classifieds

#6) It has been estimated that the total number of turtles who will see a Craigslist add that has run for d consecutive days is $N(d) = 10{,}000 - \frac{5{,}000}{d}$ turtles.

    a. Find $N(5)$.

    b. Interpret your answer from part a.

    c. Find $N'(5)$.

    d. Interpret your answer form part c.

Turtle Tech

#7) Turtle Tech finds that a turtle can memorize $I(t) = 36\sqrt{t}$ Italian phrases after being stomped t times by a plumber for $0 \leq t \leq 14$.
   a. Find the instantaneous rate of change of the phrases.
   b. Find the instantaneous rate of change after 4 stomps.
   c. Interpret your answer from part b.

Turtle Chemical Plant

#8) Turtle Chemical Plant burns oil and as a result the amount sulfur dioxide pollution blowing x miles downwind of the plant is $s(x) = 59x^{-2}$ parts per minute.
   a. Find $s(2)$.
   b. Interpret your answer from part a.
   c. Find $s'(2)$.
   d. Interpret your answer from part c.