Dirty Inc's Looks

#1) Dirty Inc specializes in selling dirty looks to customers whose faces are too nice to be able to form their own dirty looks. Dirty Inc's profit function is $P(x) = 20\sqrt{x} - 12\sqrt[3]{x}$ dollars, where x is the daily sales of dirty looks

   a. Find the marginal profit function.
   b. Find the marginal profit when 16 dirty looks have been sold.
   c. Interpret your answer from part b.

Anti Inc's Jokes

#2) Anit Inc sells jokes by the punchline. There top seller is

Question: "What is red, has large talons, whistles when you squeeze it, and likes to be called Reggie?"

Punchline: "A turtle.
So maybe I lied about it being red… and the talons.
Come to think of it, I lied about the whistling.
And tbh, his name isn't even Reggie.
Yeah, I guess I lied about the whole thing."

Anti Inc's revenue function is $R(x) = 30\sqrt[3]{x} + 4\sqrt{x}$ dollars, where x is the daily sales of punchlines.

   a. Find the marginal revenue function.
   b. Find the marginal revenue when 32 punchlines have been sold.
   c. Interpret your answer from part b.

Butt Munchers

#3) A growing problem among smokers is their tendency to litter. Scott's entrepreneurial spirit and scientific knowhow has led him to develop a new line of gerbil that will actually munch on the butts of cigarettes. The cigarette butt munchers have a cost of $5.00 each with fixed costs $1000 per week.

    a.   Find the cost function.
    b.   Find the average cost function.
    c.   Find the marginal average cost function.
    d.   Evaluate *MAC(x)* at *x = 10* and interpret your answer.

Find the first four derivatives of each function.

#4) $f(x) = 2x^4 + x - 8$ (Use Leibniz)

#5) $f(x) = \sqrt{x^3}$ (Use Newton)

#6) If $f(x) = \frac{x^2+1}{2x}$, find $f''(3)$.

#8) If $f(x) = (5x^2 + 3x - 1)(x^2 + 1)$, find the first and second derivative.

#7) If $f(x) = \frac{x+1}{x-1}$, find $f''(3)$.

#9) If $f(x) = \frac{1}{x-1}$, find the first and second derivative.

#10) $\frac{d^2}{dr^2}(\pi r^2)|_{r=3}$

Imagination Population

#12) The population of my imaginary friends t nervous breakdowns from now is predicted to be $p(t) = 12t^{3/2} + 5$ people.

    a.   Find $p(2)$ and interpret your answer.

    b.   Find $p'(2)$ and interpret your answer.

    c.   Find $p''(2)$ and interpret your answer.

#11) $\frac{d^2}{dr^2}(r^5 + r^4)|_{r=2}$

Pizza Rolls

#13) The average time it takes for a 350° Pizza Roll to exit the oven and enter my waiting, salivating mouth is 2.3 seconds. A Pizza Roll's temperature t seconds after burning my tongue is $T(t) = -10\sqrt{t} + 350$ degrees F.

    a. Find $T(4)$ and interpret your answer.
    b. Find $T'(4)$ and interpret your answer.
    c. Find $T''(4)$ and interpret your answer.

German Chocolate

#14) A delicious cake is dropped from a reverse albino pigeon while in flight. The height of the moist German chocolate cake after t seconds is $s(t) = 75 - 16t^2$ feet (neglecting air resistance, obviously).

    a. How long will it take the German chocolate cake to reach the ground?
    b. What will the velocity of the cake be when it impacts the ground?

The cake is a lie.

Cat-a-pterodactyl

#15) A evolutionary cat-a-pterodactyl (yes, it's exactly what you think it is) is carrying a newt. The cat-a-pterodactyl is planning on dropping the newt on an unsuspecting dog-a-saurus (also, what you think it is.) The newt will fall a distance of $s(t) = 16t^2$ feet (neglecting all logic and reasoning, of course). Please note t is the time in seconds after the cat-a-pterodactyl's talons/paws let go of the flesh of the newt.

    a.   If it takes 4 seconds to hit the dog-a-saurus, find the impact velocity.

    b.   Find the acceleration due to gravity.

#16) P(x) = total profit from selling x blocks of head

  x = number of blocks of head

Interpret P(3) = $21

Interpret MP(3) = $8 (Give two interpretations)

Interpret AP(3) = $7

Interpret MAP(70) = $1