1) Let $f(x) = \sqrt{1 + \sqrt{3 - x\tan(2x)}}$. Find $f'(0)$.

2) Two straight roads intersect at right angles, one road running North and South and the other road running East and West. Bill is walking North along the road through the intersection at the steady rate of 1 mile per hour. Sue is walking West along the intersecting road at the steady rate of 2 miles per hour, and she passes through the intersection one half hour after Bill. Find the minimum distance between Sue and Bill, after Bill passes through the intersection.

3) Solve the following equation for x.

$$\log_{2x}(2x + 2) - \frac{1}{2}\log_5(\frac{5}{x}) - 2\log_{25}(5\sqrt{x}) = \frac{1}{2}$$

4) A disintegrating radioactive substance decreases from 12 grams to 11 grams in one day. When will half of the substance be gone?

5) A balloon is sighted from points A and B which are 12.2 miles apart on level ground. From point A the angle of elevation is $13°$ and from point B the angle of elevation is $10°$. What is the height of the balloon?

6) How many grams of barium chloride ($BaCl_2$) should be used to prepare 35 liters of a solution which has a concentration of 0.20 moles of $BaCl_2$ per liter. One mole of barium chloride weighs about 208 grams.

7) You are told on July 1 that you have won a scholarship. The scholarship will pay you $100 at the start of every month from September 1 of your first year of college to May 1 of your senior year. Given that banks are offering 2.1% annually compounded weekly, what is the present value of all of this money on the day you find out about it? You should assume that every month has 4 weeks and there are $48 = 4 \times 12$ weeks in a year.

8) Compute the following rounding to the nearest significant digit. Show all of the steps of your work, and explain how you got your answer.

$$(123.4 - 25) \times (\frac{9.567}{.12} + 105.35)$$

9) Let $f(x) = \frac{3}{5}x^{\frac{5}{3}} - 3x^{\frac{2}{3}}$.

a) Find the domain.

b) Find the intervals of increase or decrease, and any maxima or minima.

c) Find the intervals of concavity and any inflection points.

d) Use the information from parts a-c to sketch the curve.