MATH 30, SPRING 2019: REVIEW PROBLEMS FOR EXAM 3

(1) We say the function g is the "vanverse" of the function f if

$$g(f(x)) = x^2 \qquad \text{for all } x.$$

Suppose $f(3) = 5$ and $f'(3) = 7$. Find the value of $g'(5)$. Show your work.

(2) The base of a rectangle is increasing at a rate of 4 centimeters per second, while its height is decreasing at a rate of 3 centimeters per second. At what rate is its area changing when its base is 20 centimeters and its height is 12 centimeters?

(3) Use linear approximation to approximate $80^{3/4}$.

(4) Suppose an amusement park slide has a base that is 50 feet long and is 35 feet tall. Explain why at some point the angle of steepness is 35 degrees. Your answer should have sentences, math formulas, and a picture.

[You can use a calculator on this problem—but no calculator on the test.]

(5) For the function $f(x) = 2x^3 + 3x^2 - 12x$, determine

a. intervals where f is increasing or decreasing,
b. local minima and maxima of f,
c. intervals where f is concave up and concave down, and
d. the inflection points of f.
e. Also, sketch the graph of f.

(6) Use L'Hôpital's Rule to calculate

$$\lim_{x \to 0} \frac{\ln(1 + 5x)}{e^{2x} - \cos x}.$$

. . . and be prepared for other problems like those on the homework, the worksheets, and the quizzes.