

Exam 1

Your name:

100 points total

Your TA's name:

1. [10 points] Find an equation of the tangent line to the curve $y = 6 \sin^2 x$ at the point $(\pi/4, 3)$. (Write the answer in the form $y = mx + b$.)

2. (a) [5 points] Find the constant c such that the function

$$f(x) = \begin{cases} c\sqrt{x} - 2, & \text{if } x < 1 \\ x^3 - c, & \text{for } x \geq 1 \end{cases}$$

is continuous on $(-\infty, \infty)$.

(b) [5 points] Using the definition of the continuity of a function at a point prove, that for the found c the function is certainly continuous.

3. [15 points] Calculate y' if $\cos(xy) = \sqrt{x} - y$.

4. Find the limit, probably infinite, if it exists. If the limit does not exist explain why. If it is infinity, then find its sign. Provide all the necessary steps or explanations. You can use any method.

(a) [10 points] $\lim_{t \rightarrow 4} \frac{4-t}{|4-t|},$

(b) [10 points] $\lim_{s \rightarrow \infty} (\sqrt{s^2 + 4s + 1} - s).$

(c) [10 points] $\lim_{h \rightarrow 0^-} \frac{(h - 2)^3 + 4}{h}.$

5. [15 points] A light is on the top of a 15 ft tall pole and a 6ft tall person is walking away from the pole at a rate of 2 ft/sec. At what rate is the tip of the shadow moving away from the person when the person is 25 ft from the pole?

6. [10 points] Find all vertical and horizontal asymptotes of the function $y = \frac{2x^2 + x - 1}{x^2 + x - 2}$. Sketch its graph (1 point out of 10 for the graph).

7. [10 points] If $f(x) = \sqrt{3x - 5}$ find $f''(3)$.