University of California, San Diego
Department of Mathematics

Instructions

    1. Write your *Name*, *PID*, *Section*, and *Exam Version* on the front of your Blue Book.

    2. No calculators or other electronic devices are allowed during this exam.

    3. You may use one page of notes, but no books or other assistance during this exam.

    4. Write your solutions clearly in your Blue Book.

        (a) Carefully indicate the number and letter of each question and question part.

        (b) Present your answers in the same order they appear in the exam.

        (c) Start each problem on a new page.

    5. Show all of your work. No credit will be given for unsupported answers (even if correct).

    6. Turn in your exam paper with your Blue Book.

0. (1 point) Carefully read and complete the instructions at the top of this exam sheet and any additional instructions written on the chalkboard during the exam.

1. (3 points) Solve for x or state that no solution exists: $\dfrac{e^{x^2}}{e^{10}} = \left(e^x\right)^3$

2. (6 points) Consider the function $f(x)$ graphed below. **(You must briefly explain all your answers.)**
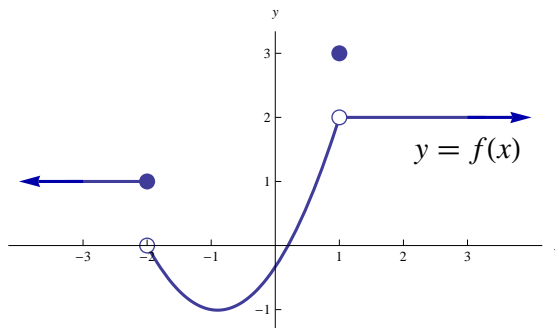
    (a) Find $\lim\limits_{x \to -2} f(x)$ or explain why it does not exist.

    (b) Find $\lim\limits_{x \to 3} f(x)$ or explain why it does not exist.

    (c) Find $\lim\limits_{x \to 1} f(x)$ or explain why it does not exist.

    (d) Is f continuous at $x = 1$?

    (e) Is f left-continuous at $x = -2$?

    (f) Is f right-continuous at $x = -2$?

3. (6 points) Let f be the function $f(x) = x - x^2$.

    (a) Find $f'(1)$ **by computing the limit**

$$f'(1) = \lim_{h \to 0} \frac{f(1+h) - f(1)}{h}.$$

    (b) Find the equation of the tangent line to the graph of $y = f(x)$ at $x = 1$.

4. (9 points) For each problem, evaluate the limit or state that it does not exist:

    (a) $\lim\limits_{x \to 4} \dfrac{\frac{1}{\sqrt{x}} - \frac{1}{2}}{x - 4}$
                    (b) $\lim\limits_{t \to 0} \sin(t) \sin(1/t)$
                    (c) $\lim\limits_{x \to 0} \dfrac{\sin(x)\sin(3x)}{x^2}$

(This exam is worth 25 points.)