

Instructions

1. Write your Name and PID in the spaces provided above.
 2. Carefully read and complete the *Excel with Integrity Pledge* on the last page.
 3. Make sure your Name is on every page.
 4. No calculators, tablets, phones, or other electronic devices are allowed during this exam.
 5. Put away ANY devices that can be used for communication or can access the Internet.
 6. You may use one handwritten page of notes, but no books or other assistance during this exam.
 7. Read each question carefully and answer each question completely.
 8. Write your solutions clearly in the spaces provided.
 9. Show all of your work. No credit will be given for unsupported answers, even if correct.
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0. (2 points) 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. (4 points) The tangent line to the graph of $y = f(x)$ at the point $(-2, 3)$ passes through the point $(4, -1)$.
 - (a) Find $f(-2)$.

(b) Find $f'(-2)$.

2. (6 points) For each of the following limits, evaluate it or show that it does not exist.

(a) $\lim_{t \rightarrow \pi} \frac{\sin(t)}{t^2 - \pi^2}$

(b) $\lim_{t \rightarrow 0} \frac{e^{2t} - 1}{t}$

(c) $\lim_{x \rightarrow \infty} \frac{2x^3 + x - 1}{4x^3 + 7}$

3. (6 points) Evaluate the derivative $\frac{dy}{dx}$ for each of the following functions $y = f(x)$.

(a) $y = \ln(\sin(x)) \tan(x)$. You need not simplify the result.

(b) $y = \frac{x^7(2x+1)^6}{(x^2+1)^8}$. You need not simplify the result.

(c) $y = \tan(\tan^{-1}(x))$. Write the result in its simplest form.

4. (6 points) Consider the function

$$f(x) = \begin{cases} \frac{1-\cos(x)}{x^2} & \text{if } x \neq 0, \\ \frac{1}{2} & \text{if } x = 0. \end{cases}$$

Show that f is continuous.

Note: To earn full credit you must (1) explain why f is continuous for every $x \neq 0$, and (2) show that f is continuous at $x = 0$.

5. (6 points) There are two distinct straight lines that pass through the point $(2, 0)$ and are tangent to the curve $y = x^3$. (Note that $(2, 0)$ is *not* a point on the curve $y = x^3$.)

Find an equation for each of these two lines.

6. (8 points) Let $f(x) = (x - 5)^2 e^x$.

(a) Find the interval(s) where f is increasing and the interval(s) where f is decreasing.

(b) Find the interval(s) where f is concave up and the interval(s) where f is concave down.

(c) Find any local maxima and any local minima of f and the numbers at which they occur.

(d) Find any inflection points of f .

7. (6 points) Consider the function $f(x) = (x^2 + 2x - 3)^2$ with domain $[-2, 2]$.

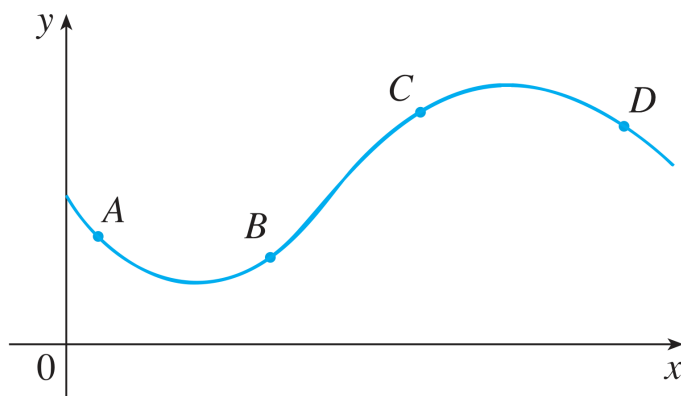
(a) Find the critical points of f .

(b) Find the absolute maximum and absolute minimum values of f and the points at which they occur.

8. (6 points) The graph of a function $y = f(x)$ is shown.

For each of the following statements, determine at which labeled point(s) it is true.

Provide justification.



(a) $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ are both positive.

(b) $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ are both negative.

(c) $\frac{dy}{dx}$ is negative and $\frac{d^2y}{dx^2}$ is positive.

Math 10A Excel with Integrity Pledge

The Excel with Integrity pledge affirms the UC San Diego commitment to excel with integrity both on and off campus, in academic, professional, and research endeavors.

According to the International Center for Academic Integrity, academic integrity means having the courage to act in ways that are honest, fair, responsible, respectful & trustworthy even when it is difficult. Creating work with integrity is important because otherwise we are misrepresenting our knowledge and abilities and the University is falsely certifying our accomplishments. And when this happens, the UCSD degree loses its value and we've all wasted our time and talents!

Name: _____ PID: _____

Excel with Integrity Pledge

*I am **fair** to my classmates and instructors by not using any unauthorized aids.*

*I **respect** myself and my university by upholding educational and evaluative goals.*

*I am **honest** in my representation of myself and of my work.*

*I accept **responsibility** for ensuring my actions are in accord with academic integrity.*

*I show that I am **trustworthy** even when no one is watching.*

Affirm your adherence to this pledge by writing the following statement in the space below:

I Excel with Integrity.

Signature: _____ Date: _____