

STUDENT NAME:

Calculus 1550, section 5. Second test. Tuesday, October 3, 2004.

This test paper has 4 pages. Points per question are given in square brackets.
The total is 50 points.

Put your name on this sheet and your initials on each page.

Q1. [5 points]

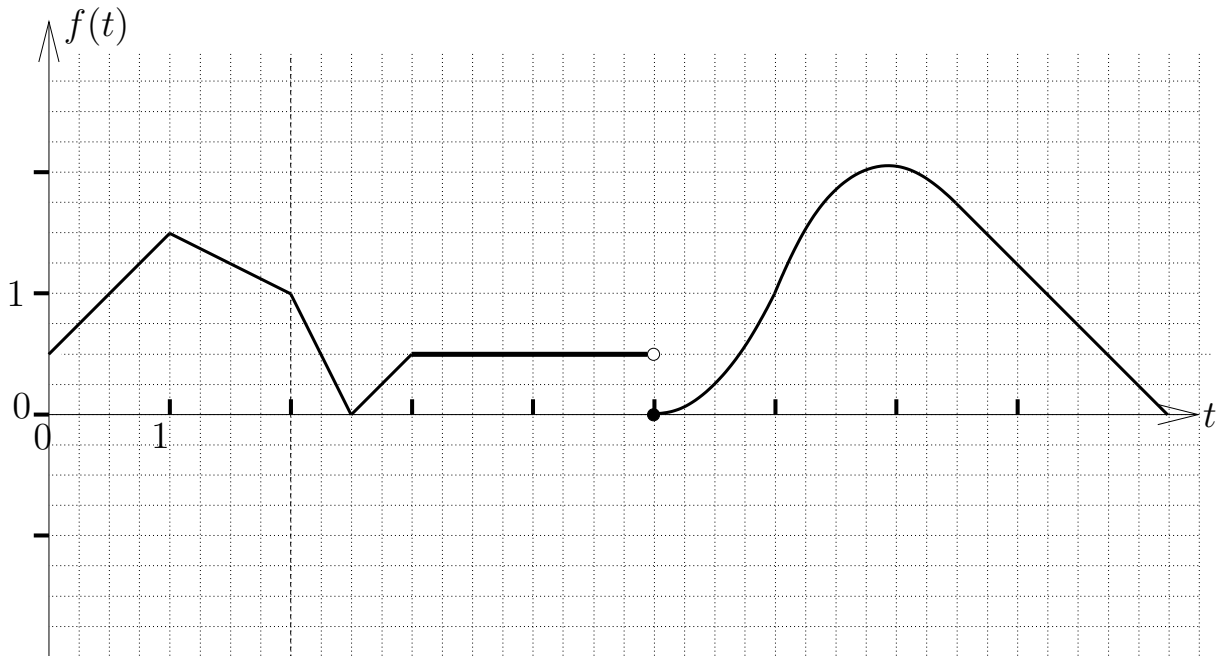
What is the definition of the derivative of a function $f(x)$ in terms of limits?

Q2. [5 points]

Give an example of a function $f(x)$ which is continuous at $x = 4$, but such that $f'(4)$ is not defined. Give an equation for $f(x)$, and sketch a graph.

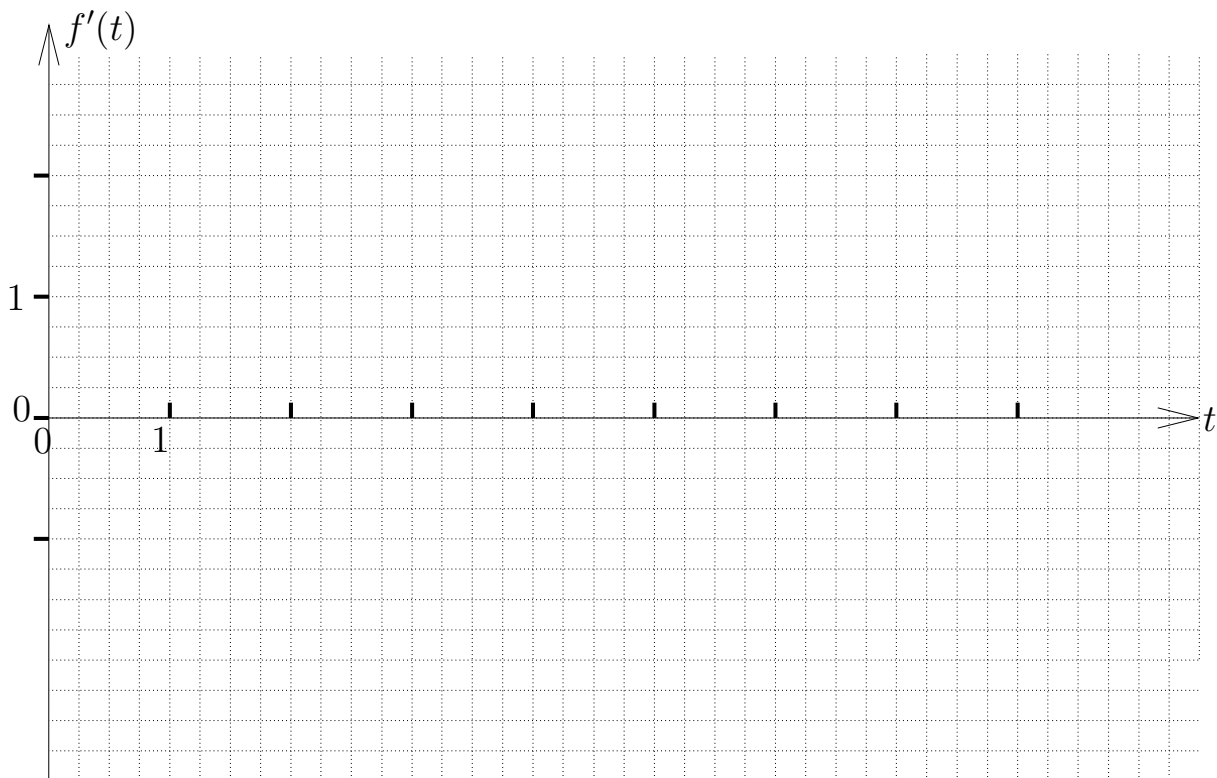
Q3. [10 points]

$f(t)$ is a function with a graph as follows:



Sketch the graph of $f'(t)$ below. Make sure your graph shows the following features:

- i Where $f'(t)$ is zero, positive and negative.
- ii Where $f'(t)$ is decreasing or increasing.
- iii Where $f'(t)$ is undefined, infinite (by drawing an asymptote), or has a discontinuity.
- iv Exact values of $f'(t)$ when $f'(t)$ is constant on some interval.



Q4. [10 points]

For which values of x does the graph of the following function have a horizontal tangent?

$$f(x) = 2x^3 + 3x^2 - 72x + 7$$

Q5. [10 points.] Find the equation for the tangent of the following function at $(1, 4)$

$$f(x) = x^3 + 2x + 1$$

Q6.

Find the derivatives of the following functions [5 points each].

i. $f(x) = e^x \cos(x)$

ii. $f(x) = \frac{\sin(x)}{x^2}$