Math 121 - Calculus I Name:
Exam 2: Practice Exam

Please be sure to neatly **show and explain all of your work** and clearly label your answers. Except for your index card, this exam is a closed-book, closed-notebook exam. Calculators are not allowed.

Please write and sign the Honor Pledge here when you are done:

Signed:

Problem	Points .
1	/12
2	/10
3	/10
4	/8
5	/10
6	/10
Total	/60

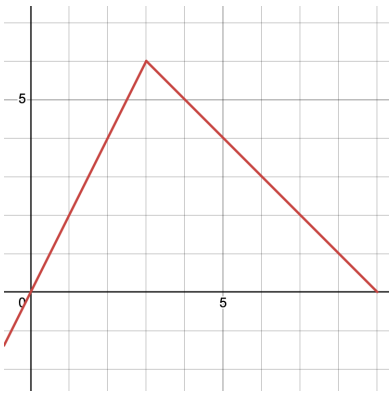
1. Please compute the following. Show all work. You do not need to simplify your final answer.

   (a) If $g(t) = \dfrac{\ln t}{t^2 + 3\tan t}$, what is $g'(t)$?

   (b) If $f(x) = e^x \cos(x^2)$, what is $\dfrac{df}{dx}$?

   (c) $h(w) = \ln(w)\sin(w)$, what is $\dfrac{d^2h}{dw^2}$?

2. Consider the following graph of f.



Let

$$F(x) = f(f(x)).$$

Please use the graph of f to find the value of $\frac{dF}{dx}$ at $x = 2$. Show all work and explain your reasoning.

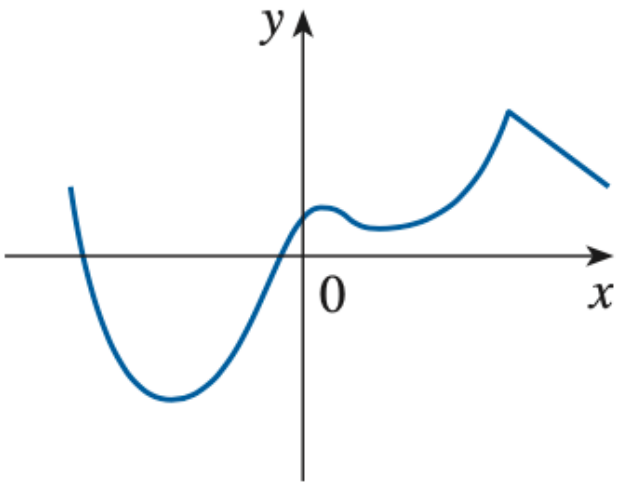
3. Suppose that

$$f(x) = \frac{1}{x+3}.$$

(a) Please use **the limit definition of the derivative** to compute $f'(x)$.

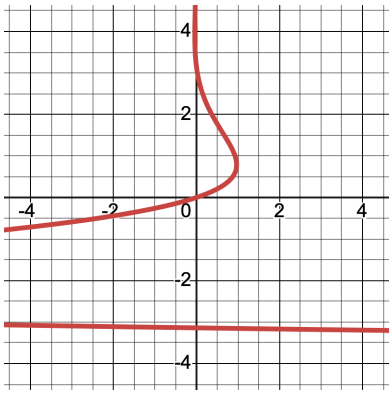
(b) Check your work: please find $f'(x)$ using a computational formula.

4. Consider the following graph of $h(x)$. Below the graph of $h(x)$, sketch a graph of the derivative of $h(x)$. Please indicate your reasoning.



5. Consider the curve defined by the equation

$$xe^y = 3\sin y.$$



(a) Explain (algebraically) how you know that the point $(0, 0)$ lies on this curve.

(b) Please find the slope of the tangent line to the curve at $(0, 0)$. Show all work.

6. Find the equation of the tangent line to the graph of

$$k(z) = \cos((\ln z)^2)$$

at the point $z = 1$. Show all work.