1. (8 points) Let $y = (1 - 3\tan\theta)\left(e^{\sin\theta}\right)$. Find $\dfrac{dy}{d\theta}$. No explanation necessary. **DO NOT SIMPLIFY** your final answer.

2. (8 points) Let $f(x) = \sqrt[4]{10 + 9\cos x}$. Find $f'(x)$. No explanation necessary. **DO NOT SIMPLIFY** your final answer.

3. (8 points) Let $g(x) = \dfrac{x^5 - 11\sqrt{x} - 10}{e^{4x} + 1}$. Find $g'(x)$. No explanation necessary. **DO NOT SIMPLIFY** your final answer.

4. (15 points) Let $f(x) = \sqrt{x+1}$. Use the **limit definition** of the derivative, not the power rule, etc., to find the value of $f'(5)$. Show all your work.

5. (15 points) Suppose $g(x)$ is described by the following table:

x	4.5	4.8	5.1	5.4	5.7
$g(x)$	7.0	6.3	5.7	5.2	4.7

(a) Find a reasonable approximation to $g'(4.8)$. Show all your work, and round off your answer to two (2) decimal places.

(b) Using your answer to part (a), find the equation of the tangent line to $y = g(x)$ at $x = 4.8$. Show all your work. **DO NOT SIMPLIFY** your final answer.

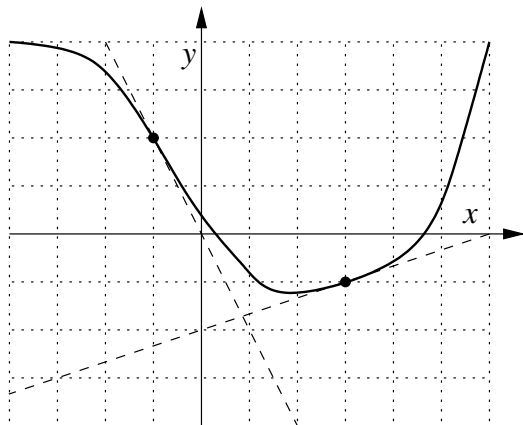**6.** (15 points) Suppose $f(x)$ is described by the following table:

x	-2	-1	0	1	2	3	4	5
$f(x)$	0	4	6	-1	5	1	3	2
$f'(x)$	2	-3	5	-1	-7	4	0	3

Suppose also that the graph of $g(x)$ is shown below, where each square is 1×1 and the indicated dashed lines are tangent lines to $y = g(x)$ at the indicated points.

(a) Let $h(x) = f(x)g(x)$. Find the value of $h'(3)$.

(b) Let $k(x) = f(g(x))$. Find the value of $k'(-1)$.

DO NOT SIMPLIFY your final answers.

7. (15 points) An analyst monitoring the price of Spambot, Inc., stock, finds that the price per share $P(t)$ of that stock t days after the beginning of 2017 is modelled by

$$P(t) = \frac{307}{11 + \cos(2t)},$$

in dollars per share.

(a) At $t = 100$ (i.e., 100 days after the beginning of 2017), is the price per share of Spambot stock **increasing** or **decreasing**? Briefly **JUSTIFY** your answer by identifying the **one** most important computation/number that supports your answer.

(b) At $t = 100$, what is the rate of increase or decrease? State your final answer in the form of a complete sentence, using the correct units, and show all your work. Round off the numerical part of your answer to two (2) decimal places.

8. (16 points) Suppose $f(x)$ has the graph shown below.

(a) On the first set of blank axes, draw the graph of f'.
(b) On the number line at bottom, indicate where $f'' > 0$ and where $f'' < 0$.

For both parts, make sure to show clearly in your graphs that phenomena happening at the same x value are vertically aligned.