1. Newton’s law of cooling states that the temperature $H$ of a pizza hot out of the oven after $t$ minutes can be calculated by the equation: $H(t) = 0.5(140 + 460e^{-0.2t})$

(a) How hot was the pizza when it was taken out of the oven?

(b) If the pizza sits out for a very long time, it will eventually remain at room temperature, which is $\lim_{t \to \infty} H(t)$. What is the temperature of the room?

(c) How long until the temperature of the pizza is 200?

2. Give a trigonometric function which best describes the graph below.

3. State the limit definition of the derivative of a function $f(x)$ at a particular value $x = a$ (so define $f'(a)$ using limits).

4. Determine the limits

(a) $\lim_{h \to 0} \frac{1400^h - 1}{h}$

(b) $\lim_{h \to 0} \frac{(3 + h)^2 - 2(3 + h) - 3}{h}$

5. Sketch the derivative of the given function $g(x)$.
6. Below is the graph of the $f'(x)$, the derivative of $f(x)$.

![Graph of $f'(x)$]

(a) Sketch the graph of $f(x)$, the antiderivative of $f'(x)$ given.

![Graph of $f(x)$]

(b) Does $f(x)$ have a local minimum value on the interval shown? If so, where?

(c) If $f(0) = 3.5$, what is the equation of the tangent line of the function $f(x)$ at $x = 0$?

7. For the function $f(x) = x^2 + 2x - 3$

(a) Determine the average rate of change of $f(x)$ from $x = 1$ to $x = 1 + h$.

(b) Determine the instantaneous rate of change at $x = 4$.

8. Differentiate the following functions using the derivative rules.

(a) $y = 3x^2 + 6\sqrt{x} - 5^x$

(b) $f(x) = 8x^4e^x + 4(7^x)$

(c) $g(x) = \frac{5x^3 - 3x^2 + x + 1}{x^2 + 1}$