MA 341 - Review Assignment 2
Question 1
The position of a car is given by the values in the table below.

| $\boldsymbol{t}$ (seconds) | 0 | 1 | 2 | 3 | 4 | 5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\boldsymbol{s}$ (feet) | 0 | 10 | 32 | 70 | 119 | 178 |

(a) Find the average velocity for the time period beginning when $t=2$ and lasting 3 seconds.

Find the average velocity for the time period beginning when $t=2$ and lasting 2 seconds.

Find the average velocity for the time period beginning when $t=2$ and lasting 1 second.
(b) Use the graph of $s$ as a function of $t$ to estimate the instantaneous velocity when $t=2$.

## Question 2

Evaluate the limit, if it exists.

$$
\lim _{t \rightarrow 0}\left[\frac{1}{t}-\frac{1}{t^{2}+t}\right]
$$

Question 3

The gravitational force $F$ exerted by Earth on a unit mass at distance $r$ from the center of the planet is given below where $M$ is the mass of the Earth, $R$ is its radius, and $G$ is the gravitational constant.

$$
F(r)= \begin{cases}\frac{G M r}{R^{3}} & \text { if } r<R \\ \frac{G M}{r^{2}} & \text { if } r \geq R\end{cases}
$$

Is $F$ a continuous function of $r$ ?

Question 4

Find an equation of the tangent line to the curve at the point $(x, y)=(-1,3)$.

$$
y=2 x^{3}-5 x
$$

Question 5

If $G(x)=\frac{x}{1+2 x}$, find $G^{\prime}(a)$. Then, use $G^{\prime}(a)$ to find an equation of the tangent line to the curve $y=\frac{x}{1+2 x}$ at the point $(x, y)=\left(-\frac{1}{4},-\frac{1}{2}\right)$.

Question 6

The graph of $g$ is given below.

(a) At what numbers is $g$ discontinuous?
(b) That what numbers is $g$ not differentiable?

The graph of the derivative of $f^{\prime}$ of a continuous function $f$ is shown below.

(a) On what interval(s) is f increasing?
(b) On what interval(s) is f decreasing?
(c) At what value(s) of $x$ does $f$ have a local maximum?
(d) At what value(s) of $x$ does $f$ have a local minimum?
(e) On what interval(s) is f concave up?
(f) On what interval(s) is f concave down?
(g) Determine the x-coordinate(s) of the point(s) of inflection.

## Question 8

Evaluate the indefinite integral.

$$
\int t^{2} \cos \left(6-t^{3}\right) d t
$$

## Question 9

Evaluate the integral.

$$
\int x^{5} \ln x d x
$$

Question 10
Evaluate the integral.

$$
\int_{0}^{4} \frac{x-1}{x^{2}+3 x+2} d x
$$

Question 11

Find the derivative of the function.

$$
y=5^{\left(1-x^{2}\right)}
$$

