

Name :

SS#

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Instructions: Do all of the following questions. Show your work and explain your answers.
Do not use calculators.

Question 1: (20 points) If $f'(x) = \frac{-5}{3-x}$ and $f(2) = 2f(1)$, find $f(x)$.

Question 2: (6 points) Give the equation of the x -axis.

Question 3: (15 points) Let $f(x) = \ln(e^{3x^4+5x^2+1})$. Find the slope of the tangent line to the graph of f at $x = 1$.

Question 4: (14 points) Let

$$G(x) = \begin{cases} \frac{x^2-5x+6}{x-3} & \text{if } x > 3 \\ \frac{x^2}{x+6} & \text{if } x < 3 \\ \sqrt{555} & \text{if } x = 3 \end{cases}$$

Find the limit of $G(x)$ as $x \rightarrow 3$.

Question 5: (15 points) Simplify:

$$\log_2(16) - \log_2(8) + \log_2(4) + \log_2(2).$$

In the following questions assume that the given programs have no syntax / run-time errors.

Question 6: (15 points) What does the following program compute? Your answer must be in terms of n and it should be as simple as possible (for example if the program computes $n!$, then your answer should be $n!$). The input (*value of n*) must be greater or equal to 7 and less than or equal to 100.

⋮

```
int MyFunc(int n)
{
    // Your value of  $n$  must be greater than or equal to 2.
    int  $i$ ,  $P = (3 * n - 1) * (3 * n + 1)$ ;
    for ( $i = 3$ ;  $i \leq (3 * n - 2)$ ;  $i++$ )
         $P = P * i$ ;
         $P = 3 * n * P * 2$ ;
    return  $P$ ;
}
```

Also, determine **MyFunc(5)**.

Question 7: (15 points) Find the output of the following program segment if the input is: $u = 20$, $y = 8$.

⋮

```
int f(int u, int v)
{
    int  $x$ ,  $t$ ,  $y$ ;
     $x = u$ ;  $y = v$ ;
    while ( $y > 0$ )
    {
         $t = y$ ;
         $y = x \% y$ ;
         $x = t$ ;
    }
}
```

```
    return  $t$ ;  
}
```