

**Math 77**  
**Final**

Name \_\_\_\_\_ SSN \_\_\_\_\_ Fall 2004

**Instructor:** Pepe Gimenez

Show your work, the right solution without explanation is useless. Be clean and organized, it is your responsibility to make yourself understood. No graphic calculators. If you did not bring your calculator, you will have to do the exam without it, sharing calculators is not allowed. Good luck!!!

1. Find the derivatives for the following functions:

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

Answer \_\_\_\_\_

(b)  $g(x) = \sqrt{x^{-7}}$

Answer \_\_\_\_\_

$$(c) h(x) = \frac{e^{-x}}{\ln x}$$

Answer \_\_\_\_\_

2. Find the antiderivatives for the following functions:

$$(a) i(x) = 2x \cos(x^2 + 1)$$

Answer \_\_\_\_\_

$$(b) j(x) = (x+3)^{\frac{5}{2}}$$

Answer \_\_\_\_\_

(c)  $k(x) = \sin(3x)$

Answer \_\_\_\_\_

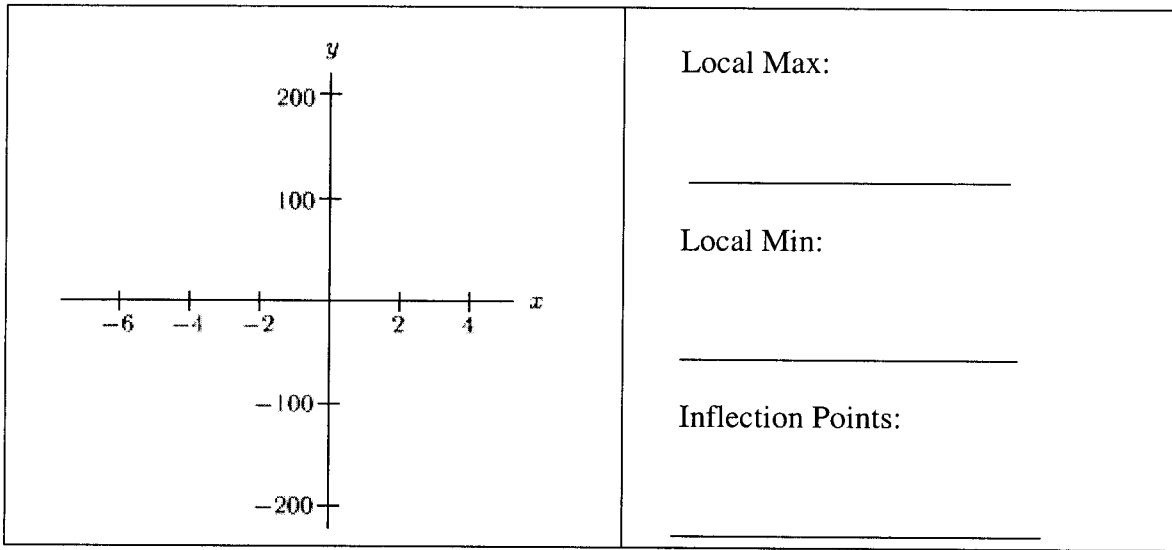
3. Decide which of the following functions could be linear, exponential or neither:

| $x$ | $f(x)$ | $g(x)$ | $h(x)$ |
|-----|--------|--------|--------|
| 0   | -6     | 5      | -2     |
| 1   | -5     | 5.5    | 3      |
| 2   | -4     | 6.05   | 8      |
| 3   | -3     | 6.655  | 13     |
| 4   | 0      | 7.3205 | 18     |

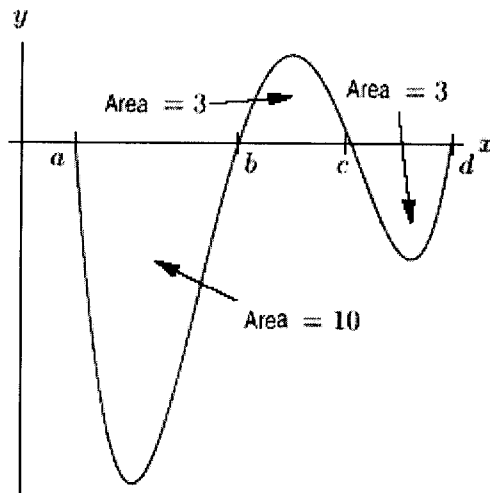
Answer \_\_\_\_\_

4. Given  $f(x) = 2x^3 - 3x^2 - 36x + 100$  on the interval  $[-6, 4]$ , find all the maxima and minima and points of inflection. Use this information to sketch the curve:

Answer :



5. Use the graph below to find the values of:



$$(a) \int_a^b f(x) dx$$

Answer \_\_\_\_\_

$$(b) \int_a^c f(x) dx$$

Answer \_\_\_\_\_

$$(c) \int_a^d f(x) dx$$

Answer \_\_\_\_\_

$$(d) \int_a^b |f(x)| dx$$

Answer \_\_\_\_\_

6. Find the average value of the function over the given interval  
(a)  $h(x) = 2x + 2$ , over  $[1, 3]$

Answer \_\_\_\_\_  
(b)  $f(x) = e^{2x}$ , over  $[0, 10]$

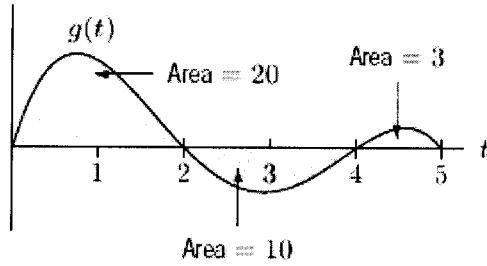
Answer \_\_\_\_\_

7. Given  $f(x) = e^{2x} - 6$ :  
(a) find the slope of tangent line to the curve at  $x = 0$

Answer \_\_\_\_\_  
(b) Use the tangent line at  $x = 0$  to estimate  $f(0.2)$

Answer \_\_\_\_\_

8. Using the information of the graph below, sketch 2 graphs of antiderivatives  $G_1(t)$  and  $G_2(t)$  of  $g(t)$  satisfying  $G_1(0) = 10$  and  $G_2(0) = -5$ . Label each critical point with its coordinates.



Answer:

| Graph of $G_1(t)$ | Graph of $G_2(t)$ |
|-------------------|-------------------|
|                   |                   |

9. Let  $g(v)$  be the fuel efficiency of a car moving at  $v$  miles per hour, with efficiency measured in miles per gallon

(a) Give the meaning, in plain English, of the equation  $g(55) = 27$

Answer \_\_\_\_\_

(b) Give the meaning, in plain English, of the equation  $g'(55) = -0.54$

Answer \_\_\_\_\_

(c) Give the units for  $g'(v)$

Answer \_\_\_\_\_

(d) Why is  $g'(55)$  negative?

Answer \_\_\_\_\_

10. Find the total area bounded between the curve  $f(x) = x^3$  and the curve  $f(x) = x^2$ , in the interval  $[0,1]$ .

Answer: Area \_\_\_\_\_