Math 77
Midterm 2

Name_____ **Fall 2005**

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 derivative of the following functions:

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

   Answer:_____

   b) $g(x) = \sqrt{e^x + 5x}$

   Answer:_____

c) $h(x) = \sin(x^3 - \sqrt{x})$

Answer:_____

d) $i(x) = e^{x^3 - 2x}$

Answer:_____

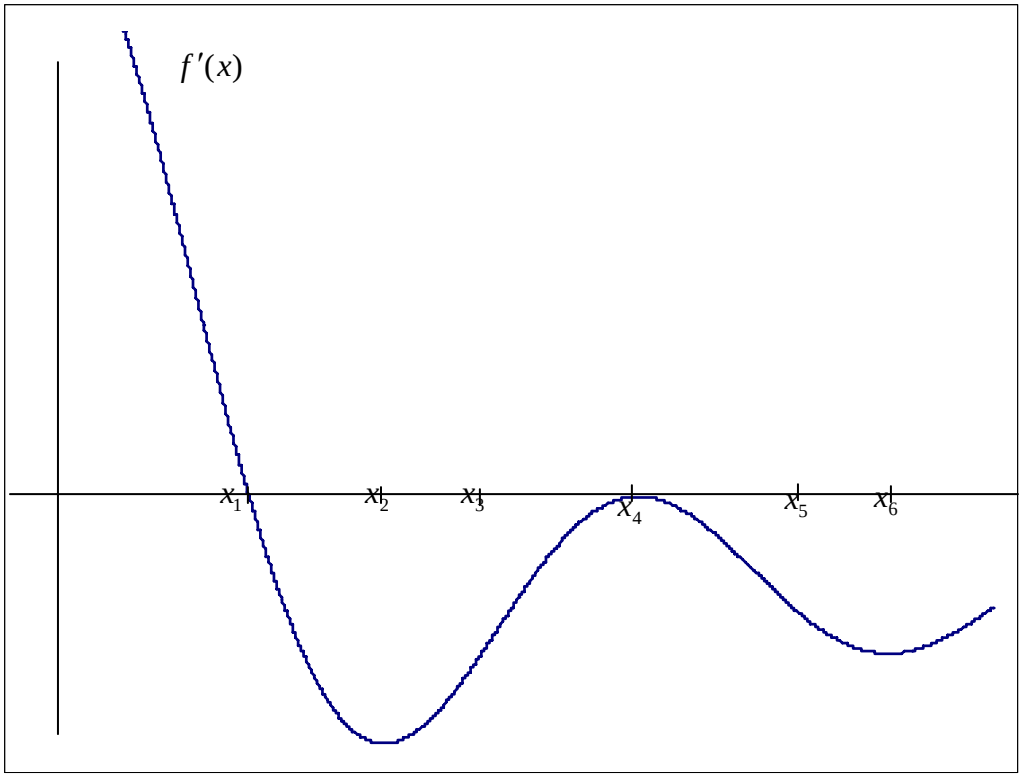
e) $j(x) = 5^x(5x + 2)$

Answer:_____

f) Given $f(3) = 4$ and $f'(3) = 5$, find $g'(3)$, where $g(x) = \dfrac{5x}{f(x)}$

Answer:_____

2. Below is the graph of the **derivative** of the function $f(x)$.



a) List the critical points of $f(x)$

Answer:_____

b) State the intervals on which $f(x)$ is increasing

Answer:_____

c) State the intervals on which $f(x)$ is decreasing

Answer:_____

d) Is there any point at which $f(x)$ attains a maximum? If your answer is yes, please say at which point or points.

Answer:_____

e) Is there any point at which $f(x)$ attains a minimum? If your answer is yes, please say at which point or points

Answer:_____

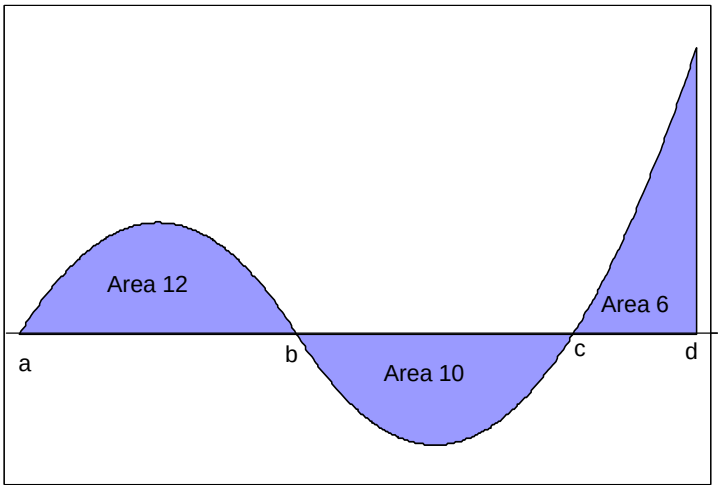
3. Find the global maximum and the global minimum of the function $f(x) = 2x^3 - 9x^2 + 12x + 2$ on the interval $[-1,1]$.

Answer:_____

4. Find the tangent line approximation for $f(x) = \frac{2}{x}$ near $x = 1$. Then use it to approximate $f(1.1)$

Answer:_____

5. Use the graph of a function $f(x)$ below to find the values of the following integrals



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) $\int_b^d |f(x)|dx$ Answer:_____

6. Using the table below calculate the left-hand sum and the right-hand sum to estimate $\int_0^3 f(x)dx$.

x	0	1	2	3
f(x)	10	15	25	40

Answer:_____

7. Your velocity is $v(t) = t^2 + 1$ for $0 \le t \le 3$. Estimate the distance travelled during this time.

Answer:_____

8. Make the graph of a function with the following properties:
   - $f(x)$ is increasing for $0 < x < 3$ and for $x > 5$
   - $f(x)$ is decreasing for $3 < x < 5$
   - $f(x)$ is concave up for $1 < x < 2$ and for $x > 4$
   - $f(x)$ is concave down for $0 < x < 1$ and for $2 < x < 4$

9. Find the average value of the function $f(x) = e^x + x^2$ on the interval [0,3]

Answer:_____

10. Give two antiderivatives of the function $f(x) = \sqrt{x^3}$.

Answer:_____