SAMPLE MIDTERM 2 MAT 122 Fall 2003
Midterm 1 is 8:30-10:00pm, Wed. 11/12/03
Exam locations given on right

room	sections
Old Eng 145	R1, R3
Lib Alliance	R2, ELC2

1. Compute the derivative of each of the following functions.

   (i) x^3

   (ii) $1/x$

   (iii) 2^x

   (iv) $x^6 + 4x^3 + 1$

   (v) $x^2 \ln x$

   (vi) $\ln(x^2 + 1)$

   (vii) $(x^2 + 1)/(x^2 - 1)$

   (viii) $\ln(x^2(1 + x)^6)$

   (ix) $x^7 e^{x^2+x}$

   (x) $(x^2 + 1)(x^7 + 1)^2(x - 1)^3$

2. Compute the second derivative of each of the following functions.

   (i) x^3

   (ii) $x^2 e^{-x}$

   (iii) $\ln(x + x^2 + x^3)$

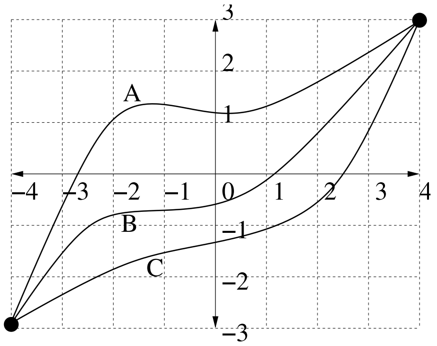
3. The three graphs in the following figure represent the positions of three particles moving along a line between times $t = -4$ and $t = 4$. Answer each of the following questions based on these graphs, using the letter, A, B or C, representing each graph. Recall that if f represents the position of a particle then f' is called its velocity and f'' is called its acceleration.

   (i) Which particle is moving fastest at time $t = -4$?

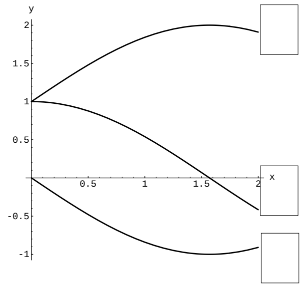
   (ii) Which particle has the highest average velocity between $t = 0$ and $t = 4$?

   (iii) Which particle has a negative velocity at some time?

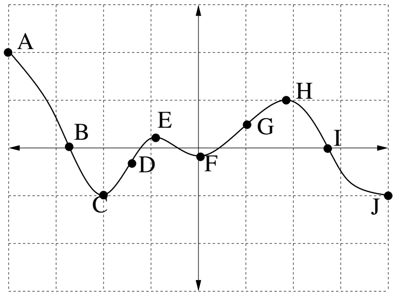
   (iv) At time $t = -2$ is the acceleration of particle A positive or negative?



4. In the following figure, a function f and its first two derivatives, f' and f'', are graphed. Label each graph by putting a f, f' or f'' in the adjacent box.



5. Answer each of the following questions based on the graph of f' at the right. List all appropriate points in given box. For local maximums and local minimums always include endpoints.



(i) List all local maximum points of f

(ii) List all local minmum points of f

(iii) List all inflection points of f

(iv) List all critical points of f

(v) List all local maximum points of f'

6. Answer the following questions about the function $f(x) = x^4 - 4x^3 + 2$ on the interval $-1 \leq x \leq 4$.

(i) What is $f'(x)$?

(ii) What is $f''(x)$?

(iii) Where are the critical points of f?

(iv) List all local maximums of f (include endpoints).

(v) Where is the global maximum of f on this interval?

(vi) What is the maximum value of f on this interval?

(vii) Where is the global minimum?

(viii) What is the minimum vlaue of f on this interval?

(ix) List all inflection points of f?

(x) Where is the function convex down?