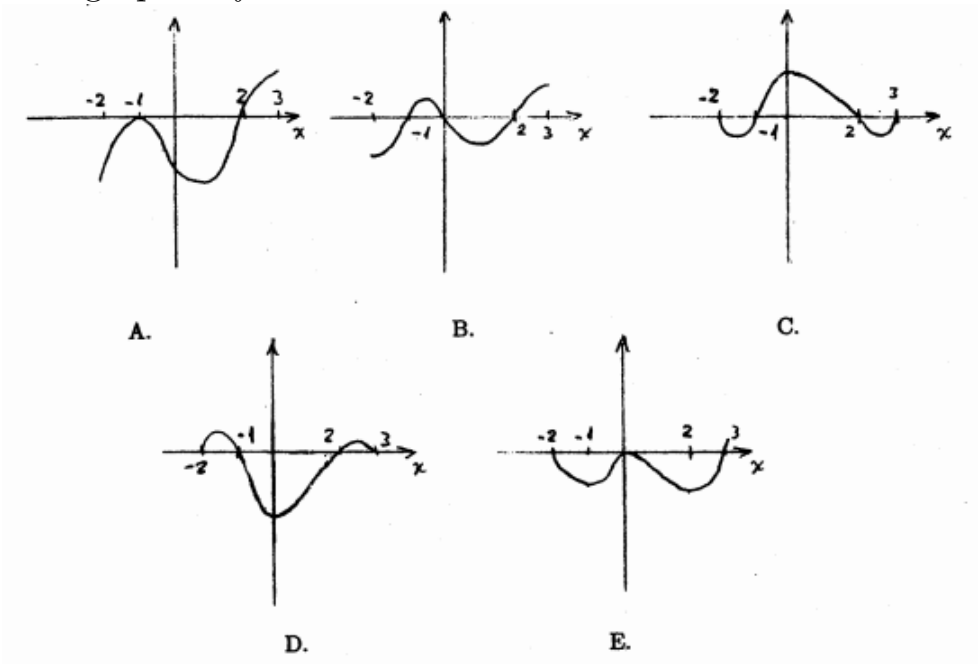
Review Problems

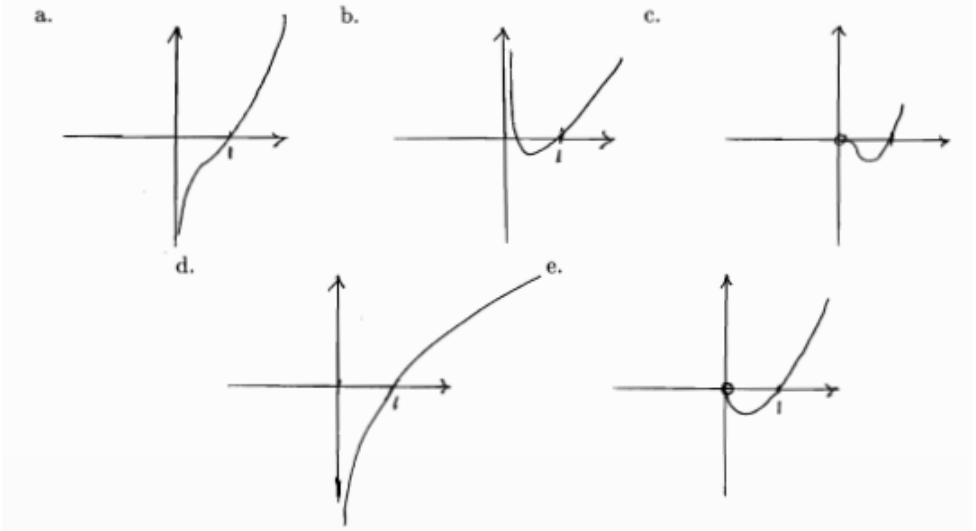
November 10, 2016

1. (Fall 2015, Exam 3, #2) A spotlight on the ground shines on a wall 12 m away. If a man 1.8 m tall walks from the wall to the spotlight at a speed of 1 m/s, how fast is the length of his shadow on the wall changing when he is 3.6 m from the spotlight?

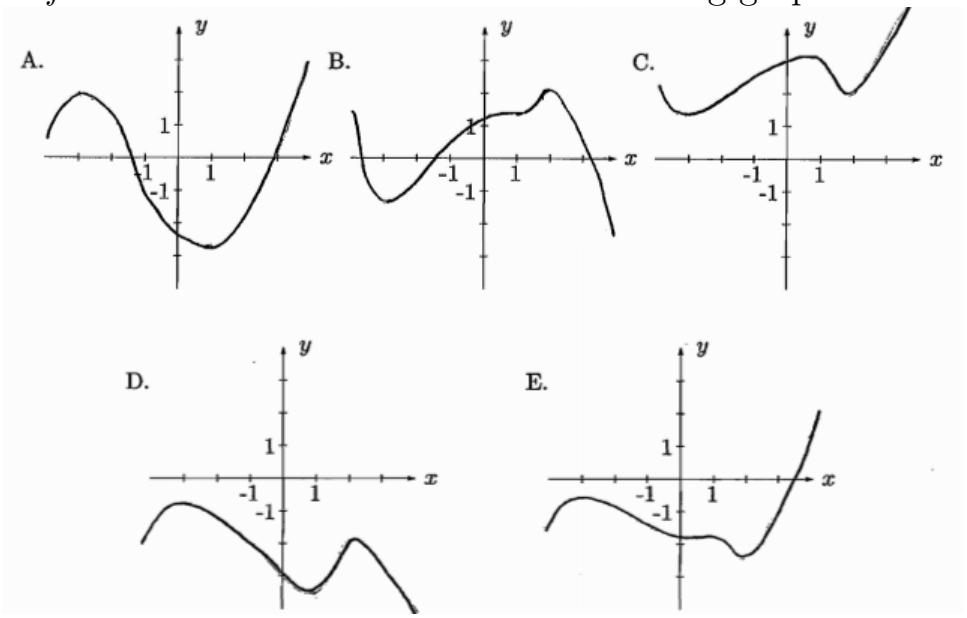
2. (Fall 2003, Exam 3, #1) Given that $f'(x) > 0$ when $-1 < x < 0$ and $2 < x < 3$, and $f'(x) < 0$ when $-2 < x < -1$ and $0 < x < 2$, which could be a graph of f?



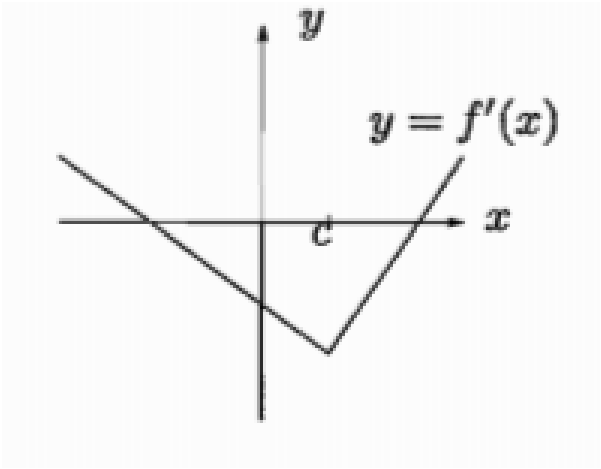
3. (Fall 2005, Exam 3, #13) The graph of $f(x) = x^2 \ln x$ resembles most:



4. (Fall 2008, Exam 3, #9) If $f'(x) = (x-1)(2-x)(x+3)$, then the graph of f can look like which one of the following graphs?



5. (Fall 2008, Exam 3, #10) The graph of f' is given on the right. Which of the following is true?



   (a) f has a local min at $x = c$
   (b) f is not differentiable at $x = c$
   (c) f has an inflection point at $x = c$
   (d) f is increasing for all x such that $x > c$
   (e) $f(x) < 0$

6. (Fall 2002, Exam 3, #4) Let $f(x) = xe^x$.
   (a) Find asymptotes, if any, of f.
   (b) Find intervals of increase and decrease of f and find local maxima and minima, if any.
   (c) Find intervals of concavity and inflection points, if any.
   (d) Find all intercepts.
   (e) Sketch the graph, indicating the point $(1, f(1))$ and the points found in (b), (c), and (d). (Recall $e \approx 2.71828$)