REVIEW 5 – CURVE SKETCHING

1-2 Verify that Rolle's Theorem applies on the given interval and find all values c guaranteed by Rolle's Theorem.

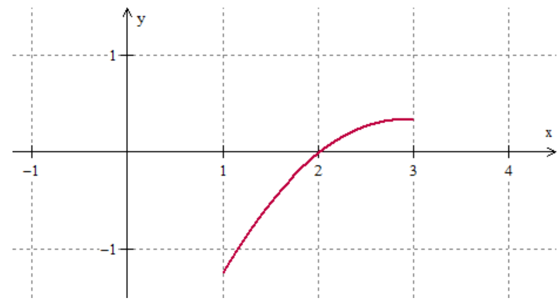
1. $f(x) = x^2 - 2x$ on [0,2]
2. $f(x) = x - x^{1/3}$ on [0,1]

3. Find the number c that satisfies the Mean Value Theorem for $f(x) = x^3 - 7x + 6$ on the closed interval [1,3].

4. The number of inflection points on $f(x) = 3x^7 - 10x^5$?
   a. 0
   b. 3
   c. 2
   d. 1
   e. 5

5. If c is the number that satisfies the conclusion of the MVT for $f(x) = x^3 - 2x^2$ on [0,2], then c is
   a. 0
   b. ½
   c. 1
   d. 4/3
   e. 2

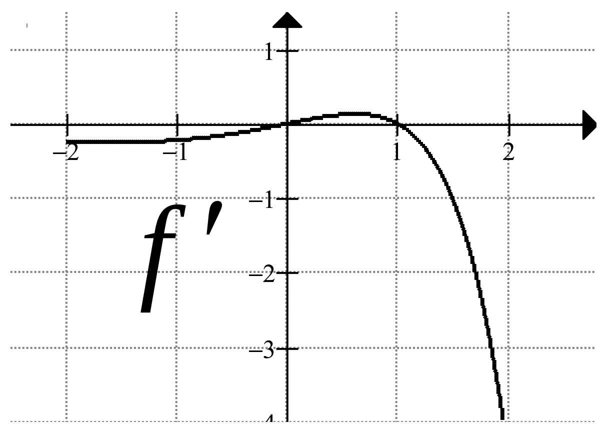
6. The graph of a twice differentiable equation f is shown. Which is true?
   a. $f(2) < f'(2) < f''(2)$
   b. $f'(2) < f(2) < f''(2)$
   c. $f''(2) < f'(2) < f(2)$
   d. $f(2) < f''(2) < f'(2)$
   e. $f''(2) < f(2) < f'(2)$



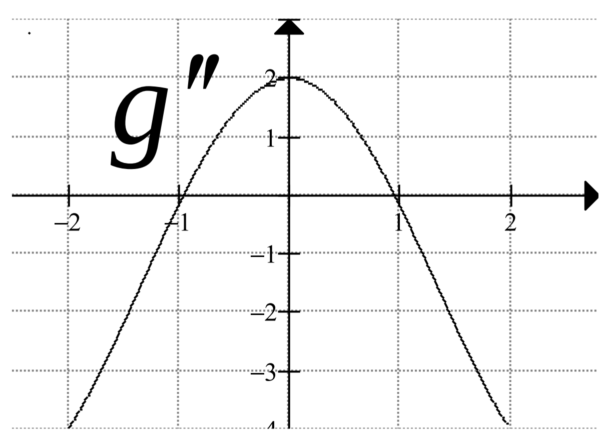
7. Use the graph of f' on [-2,2] to answer each.
   a. Name the local maximum of f. JYA.
   b. Name the point(s) of inflection of f.
   c. Name the interval(s) that f is concave up.
   d. Put the following in order of least to greatest:

      $f(-2), f(0), f(1), f(2)$

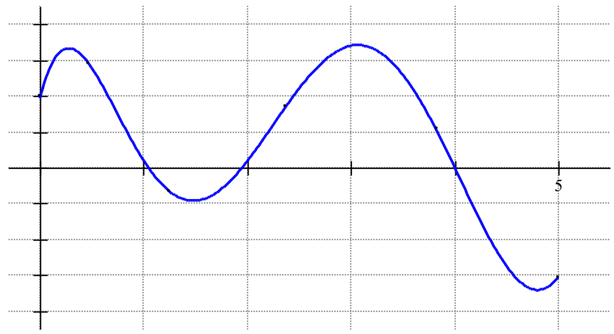
   e. If $g(x) = 2x^2 - x + 1$ and $h(x) = f(g(x))$, find $h'(1)$



8. Use the graph of g'' on [-2,2] to answer each.
   a. Over what intervals is g concave up? JYA
   b. Over what intervals is g' concave up? JYA.
   c. Name the point(s) of inflection on g.
   d. Name the point(s) of inflection on g'.
   e. Is $g''''(0)$ positive or negative? Why?



9. At how many points on the interval $[0,5]$, does f(x) satisfy the Mean Value Theorem?
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4
   f. 5



10. Name x values of any critical points.
   a. $h(x)=\sqrt{x}(x-3)$, (x>0)
   b. $g(x)=\sin x+\cos x$, $[0,2\pi]$

11. Graph each. Include a chart that shows intervals that the function is increasing/decreasing, concavity, horizontal/vertical asymptotes, points of inflection.
   a. $f(x)=x^{2/3}+1$
   b. $f(x)=x^3-6x^2-1$

12. Perform the 1st derivative test.
   a. $h(x)=\frac{1}{4}x^4-8x$
   b. $f(x)=(x^2-4)^2$

13. Perform the 2nd derivative test on $f(x)=2x^2(1-x^2)$.

14. Name the absolute extrema on the given interval.
   a. $f(x)=2x^2-4x-1$, [-1,3]
   b. $f(x)=\sin 2x$, $[0,\pi]$

15. Name largest open intervals that f is increasing/decreasing.
   a. $f(x)=x^2-x+2$
   b. $g(x)=\frac{x}{x-2}$

16. Name largest open intervals that f is concave up/concave down.
   a. $f(x)=x+\cos x$, $[0,2\pi]$
   b. $g(x)=(x+2)^2(x-4)$

Find the **absolute extrema** on the given interval.

17. $f(x)=3x^2-12x+5$, $[0,3]$
18. $f(x)=\frac{x}{x^2+1}$, $[0,2]$

From the given derivatives make an accurate graph. Include a chart.

19. $f(x)=\frac{x^2}{x^2+3}$, $f'(x)=\frac{6x}{(x^2+3)^2}$, $f''(x)=\frac{-18(x^2-1)}{(x^2+3)^3}$

20. $f(x)=3x^{2/3}-2x$, $f'(x)=\frac{2}{x^{1/3}}-2$, $f''(x)=\frac{-2}{3x^{4/3}}$