EMCF 20

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1. Classify the smallest critical number of $f(x) = x^4 - 8x^2 - 1$.
   a. Local max
   b. Local min
   c. Neither a local max nor a local min
   d. None of these.
2. Classify the largest critical number of $f(x) = x^4 - 8x^2 - 1$.
   a. Local max
   b. Local min
   c. Neither a local max nor a local min
   d. None of these.
3. Give a value of c that verifies the mean value theorem for the function $f(x) = \sqrt{x+1}$ on the interval [0,3].
   a. 5/4
   b. 7/4
   c. 3/2
   d. 12
   e. 5/2
   f. None of these.
4. Use differentials to approximate a value for $f(1.9)$ given that $f(2) = -1$ and $f'(x) = \sqrt{x^3+1}$.
   a. -1.1
   b. -1.15
   c. -1.2
   d. -1.25
   e. -1.3
   f. None of these.
5. Use Newton's method to approximate $\sqrt{63}$. **Hint:** You know $\sqrt{63}$ is a solution to $x^2 - 63 = 0$, and 8 is a decent first guess.
   a. 7.9
   b. 7.925
   c. 7.325
   d. 7.375
   e. 7.94
   f. None of these.

6. Classify the critical number $x = -1$ for the function $f(x) = 1 - 3x + x^3$.
    a. Local max
    b. Local min
    c. Neither a local max nor a local min
    d. None of these.
7. Give the absolute **minimum** value of $f(x) = 1 - 3x + x^3$ on the interval [0,2].
    a. -1
    b. 0
    c. 1
    d. 2
    e. 3
    f. None of these.
8. Give the absolute **maximum** value of $f(x) = 1 - 3x + x^3$ on the interval [0,2].
    a. -1
    b. 0
    c. 1
    d. 2
    e. 3
    f. None of these.
9. Select an interval below on which $f(x) = x^2(x-1)^2$ is **decreasing**.
    a. $(-\infty, 0]$
    b. $(-\infty, 1]$
    c. $[1, \infty)$
    d. [0,1]
    e. [0,2]
    f. None of these.
10. Select an interval below on which $f(x) = x^2(x-1)^2$ is **increasing**.
    a. $(-\infty, 0]$
    b. $(-\infty, 1]$
    c. $[1, \infty)$
    d. [0,1]
    e. [0,2]
    f. None of these.