

Do Not Use Calculator

- 1) Determine where $y = 7x^3 - 4x^2 - 4x + 15$ has local maximum or minimum values. 1) _____
- | | |
|---------------------------------------|---------------------------------------|
| A) local max where $x = -\frac{2}{3}$ | B) local max where $x = -\frac{2}{7}$ |
| local min where $x = \frac{2}{7}$ | local min where $x = \frac{2}{3}$ |
| C) local max where $x = \frac{2}{3}$ | D) local max where $x = \frac{2}{7}$ |
| local min where $x = -\frac{2}{7}$ | local min where $x = -\frac{2}{3}$ |

- 2) Find the absolute maximum value of the function $f(x) = -\frac{x^4}{4} + 2x^3 + 8x^2$. 2) _____
- Support your answer graphically.
- A) 8 B) 512 C) -2 D) 12

- 3) Suppose $f'(-1) = 0$, $f'(x) > 0$ to the right of $x = -1$, and $f'(x) < 0$ to the left of $x = -1$. Does f have a relative minimum, a relative maximum, or neither at $x = -1$? Explain your answer. 3) _____

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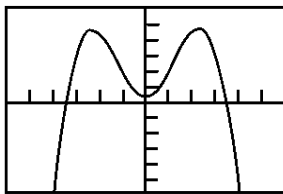
- 4) For $y = x^4 - 12x^2 + 8$, use analytic methods to find the exact intervals on which the function is 4) _____
- (a) concave up
- (b) concave down.
- Then
- (c) find any inflection points.

- 5) Let $y = e^{-2x}$ on the domain $[2, 3]$. Find the exact intervals on which the function is 5) _____
 (a) increasing
 (b) decreasing
 Then
 (c) find any local extreme values.

- 6) Find the subinterval(s) of $[0, 2\pi]$ on which the graph of $\cos x$ is concave up. 6) _____
 A) $(0, \frac{\pi}{2}) \cup (\frac{3\pi}{2}, 2\pi)$ B) $(\pi, 2\pi)$
 C) $(0, \pi)$ D) $(\frac{\pi}{2}, \frac{3\pi}{2})$

- 7) Let $f(x) = x^4 + ax^2$. What is the value of a if f has a local minimum at $x = 5$? 7) _____
 A) $a = -150$ B) $a = -50$ C) $a = 50$ D) $a = 0$

- 8) Use the graph of $f'(x)$ to estimate the interval(s) on which the function f is increasing. 8) _____
 Explain your answer.



$[-6, 6]$ by $[-6, 6]$

- (a) $(-\infty, -3.5] \cup [3.5, \infty)$
 (b) $[-3.5, 3.5]$
 (c) $(-\infty, -2.4] \cup [0, 2.4]$
 (d) $[-1.41, 1.41]$
- 9) Let $f(x) = x^4 + ax^2$. What is the value of a if f has a point of inflection at $x = -6$? 9) _____

Answer Key

Testname: WORKSHEET 4.1, 4.3.TST

- 1) Answer: B
- 2) Answer: B
- 3) Answer: neither
- 4) Answer: (a) $(-\infty, -\sqrt{2}), (\sqrt{2}, \infty)$
(b) $(-\sqrt{2}, \sqrt{2})$
(c) $(-\sqrt{2}, -12)$ and $(\sqrt{2}, -12)$
- 5) Answer: (a) none
(b) $[2, 3]$
(c) maximum at $(2, e^{-4})$; minimum at $(3, e^{-6})$
- 6) Answer: D
- 7) Answer: B
- 8) Answer: (b) The function is increasing when the derivative is greater than zero.
- 9) Answer: $a = -216$