Calculus BC
Review for Test

Name ___________________________

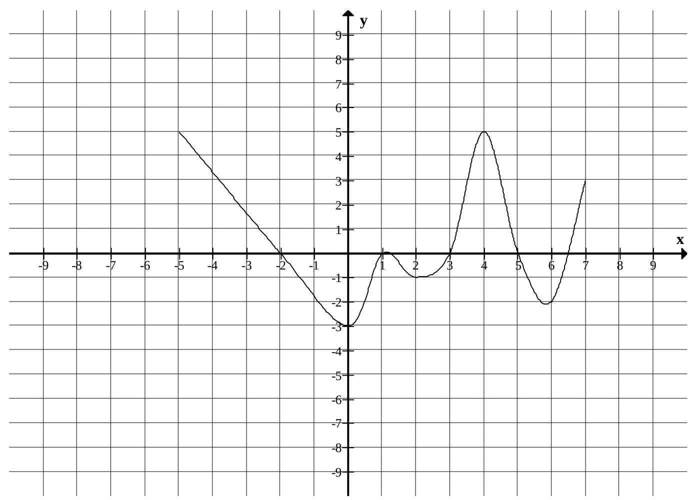
1. Given that $f(x) = x^3 - 3x^2 + 12$ on the interval [-2,4]

a. Find all critical numbers of f.

b. Find the absolute extrema of f.

2. Find the absolute maximum and absolute minimum values of f on the given interval.
$f(x) = 3x - \cos x \quad [-\pi, \pi]$ Show all the calculus that leads to your conclusion.

3. The graph of f′, the derivative of f is sketched below. Use this graph to answer the following questions.



a. Over what intervals is f increasing and decreasing.

b. Over what intervals is f concave up and concave down.

c. Find all extrema and points of inflection of f.

4. Given the function $f(x) = x - 3x^{\frac{1}{3}}$ find the following: You must show all the calculus that leads to your conclusions.

A) The intervals of increase and decrease.

B) The local maximum and minimum values.

5. Given the function $f(x) = x^3 - 12x + 1$

a) Find the intervals on which f is concave up or concave down. Show all the calculus that leads to your conclusion.

b) Find any points of inflection. Justify your answer.

6. Determine if the Mean Value Theorem applies to the function $f(x) = 2 - x^2$ on the interval $\left[0,\ \sqrt{2}\right]$. If so, find **ALL** points (x-values only) that are guaranteed to exist by the Mean Value Theorem.

a) No, Mean Value Theorem does not apply.

b) Yes; $x = -\dfrac{2}{\sqrt{2}} + 2$

c) Yes; $x = \dfrac{1}{\sqrt{2}}$

d) Yes; $x = \pm\dfrac{1}{\sqrt{2}}$

7. If f′(4) = 0 and f″(4) = 3, then there is a ______________ at x = 4.

a) relative maximum

b) relative minimum

c) point of inflection

8. $f(x) = \sin(2x)\ln x^2$

9. $f(x) = \ln\left(\dfrac{x}{x+1}\right)$

10. $y = x^2 2^{3x+5}$

11. $f(x) = \log_2 \dfrac{x}{x+2}$

12. $y = \sqrt{e^{2x} + e^{-2x}}$

13. $f(x) = e^{-x^2}$

14. $y = \arcsin\sqrt{x}$

15. $y = \operatorname{arcsec}\left(e^{2x}\right)$

16. Differentiate Implicitly $x^2 - xy + e^y = 8$

17. $\cos(x - y) = xe^x$

18. For the following function, find any relative extrema, and intervals where the functions is increasing and decreasing.

$y = \dfrac{x^2}{2} - \ln x$

19. Find an equation of the tangent line to the graph of the function.

$y = x^3 e^x - xe^x + 2e^x$ at x=1.