This print-out should have 17 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Find the derivative of

$$f(x) = \frac{\sinh(x)}{3 - \cosh(x)}\,.$$

1. $f'(x) = \dfrac{3\sinh(x) + 1}{3 - \cosh(x)}$

2. $f'(x) = \dfrac{3\cosh(x) - 1}{(3 - \cosh(x))^2}$

3. $f'(x) = \dfrac{3\sinh(x)}{(3 - \cosh(x))^2}$

4. $f'(x) = \dfrac{3\cosh(x) + 1}{3 - \cosh(x)}$

5. $f'(x) = \dfrac{3\sinh(x)}{3 - \cosh(x)}$

002 10.0 points

Find all the critical points of

$$f(x) = x(5 - x)^6\,.$$

1. $x = -5\,,\ \dfrac{5}{7}$

2. $x = -\dfrac{5}{7}$

3. $x = 1$

4. $x = \dfrac{5}{7}$

5. $x = 5\,,\ \dfrac{5}{7}$

6. $x = -5\,,\ 1$

7. $x = -1$

8. $x = 5\,,\ 1$

003 10.0 points

Find all the critical points of

$$f(x) = x(1 - x)^{3/5}\,.$$

1. $x = 1$

2. $x = -1,\ -\dfrac{5}{8}$

3. $x = -\dfrac{5}{8}$

4. $x = -1,\ \dfrac{5}{8}$

5. $x = -1$

6. $x = \dfrac{5}{8}$

7. $x = 1\,,\ \dfrac{5}{8}$

8. $x = 1,\ -\dfrac{5}{8}$

004 10.0 points

Find all the critical points of

$$f(x) = x(1 + x)^{5/3}$$

1. $x = -1,\ \dfrac{3}{8}$

2. $x = \dfrac{3}{8}$

3. $x = -1,\ -\dfrac{3}{8}$

4. $x = 1$

5. $x = -1$

6. $x = 1,\ -\dfrac{3}{8}$

7. $x = -\frac{3}{8}$

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005 10.0 points

Find all the critical points of

$$f(x) = x(x+2)^{3/5}.$$

1. $x = -\frac{5}{4}$

2. $x = -2$

3. $x = 2$

4. $x = -2, \ -\frac{5}{4}$

5. $x = -2, \ \frac{5}{4}$

6. $x = 2, \ \frac{5}{4}$

7. $x = \frac{5}{4}$

8. $x = 2, \ -\frac{5}{4}$

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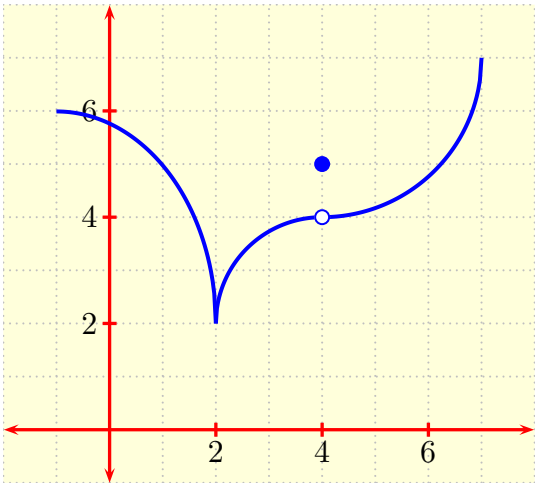
006 10.0 points

If f is the function whose graph is given by



which of the following properties does f NOT have?

1. $f'(x) > 0$ on $(4, 7)$

2. $\lim_{x \to 2^+} f(x) = \lim_{x \to 2^-} f(x)$

3. $\lim_{x \to 4} f(x) = 5$

4. critical point at $x = 2$

5. local maximum at $x = 4$

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007 10.0 points

If the graph of the function defined on $[-3, 3]$ by

$$f(x) = x^2 + ax + b$$

has an absolute minimum at $(-1, 3)$, determine the value of $f(1)$.

1. $f(1) = 6$

2. $f(1) = 9$

3. $f(1) = 7$

4. $f(1) = 10$

5. $f(1) = 8$

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008 10.0 points

Find all the critical points of f when

$$f(x) = \frac{x}{x^2 + 25}.$$

1. $x = -25, 25$

2. $x = -5, 25$

3. $x = -5, 5$

4. $x = -25, 5$

5. $x = 0, 5$

6. $x = -5, 0$

009 10.0 points

Find all the critical points of f when

$$f(x) = x^{4/5}(x-5)^2 .$$

1. $x = 0,\ \frac{5}{7},\ 5$

2. $x = 0,\ \frac{10}{7},\ 5$

3. $x = 0,\ \frac{10}{7}$

4. $x = \frac{5}{7},\ 5$

5. $x = 0,\ \frac{5}{7}$

6. $x = \frac{10}{7},\ 5$

010 10.0 points

Find all the critical points of

$$f(x) = \cos^2 x + \sqrt{3}\,\sin x$$

on $(-\pi/2,\, \pi/2)$.

1. $c = -\frac{\pi}{3},\ \frac{\pi}{3}$

2. $c = \frac{\pi}{6}$

3. $c = -\frac{\pi}{3},\ 0,\ \frac{\pi}{3}$

4. $c = \frac{\pi}{3}$

5. $c = 0$

6. $c = -\frac{\pi}{6},\ 0,\ \frac{\pi}{6}$

011 10.0 points

Determine the absolute minimum value of

$$f(x) = x\sqrt{1-x^2} + 4$$

on $[-1,\, 1]$.

1. absolute min. value $= 5$

2. absolute min. value $= 3$

3. absolute min. value $= \frac{7}{2}$

4. absolute min. value $= \frac{9}{2}$

5. absolute min. value $= \frac{5}{2}$

6. absolute min. value $= 4$

012 10.0 points

Determine the absolute maximum value of

$$f(x) = \frac{4+2x}{x^2+5}$$

on the interval $[-1,\, 2]$.

1. none of the other answers

2. abs max $= \frac{8}{9}$

3. abs max $= \frac{7}{5}$

4. abs max $= 1$

5. abs max $= \frac{1}{3}$

013 10.0 points

Determine if Rolle's Theorem can be applied to

$$f(x) = \frac{x^2+3x-18}{x+3}$$

on the interval $[-6,\, 3]$, and if it can, find all numbers c satisfying the conclusion of that theorem.

1. $c = -3,\ -\frac{3}{2}$

2. $c = -\frac{3}{2}$

3. Rolle's Theorem not applicable

4. $c = -1$

5. $c = -3$

6. $c = -3,\ -15$

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014 10.0 points

Determine if Rolle's Theorem can be applied to

$$f(x) = \frac{x^2 + 2x - 8}{x + 6}$$

on the interval $[-4, 2]$, and if it can, find all numbers c satisfying the conclusion of that theorem.

1. $c = -2$

2. Rolle's Theorem not applicable

3. $c = -\frac{2}{3}$

4. $c = -2,\ -10$

5. $c = -2,\ -1$

6. $c = -1$

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015 10.0 points

Determine if the function

$$f(x) = x\sqrt{12 - x}$$

satisfies the hypotheses of Rolle's Theorem on the interval $[0, 12]$, and if it does, find all numbers c satisfying the conclusion of that theorem.

1. $c = 4,\ \ 5$

2. $c = 8$

3. $c = 5$

4. hypotheses not satisfied

5. $c = 9$

6. $c = 8,\ \ 9$

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016 10.0 points

Determine if the function

$$f(x) = x^2 - x + 2$$

satisfies the hypotheses of the Mean Value Theorem (MVT) on the interval $[-3, 3]$.

If it does, find all possible values of c satisfying the conclusion of the MVT.

1. $c = \frac{3}{2}$

2. $c = -\frac{3}{2}$

3. $c = -\frac{3}{2},\ \ 0$

4. $c = 0$

5. $c = 0,\ \ \frac{3}{2}$

6. hypotheses not satisfied

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017 10.0 points

Determine if the function

$$f(x) = 3 - x - x^3$$

satisfies the hypotheses of the Mean Value Theorem (MVT) on the interval $[-2, 1]$.

If it does, find all possible values of c satisfying the conclusion of the MVT.

1. $c = -\frac{1}{2}$

2. $c = -1$

3. hypotheses not satisfied

4. $c = \dfrac{1}{2}$

5. $c = 0$