April 9, 2015

MA 161 - EXAM # 3

GREEN Exam - Test Version 01

INSTRUCTIONS

1. Make sure the color of your scantron matches the color of this cover page.
2. Use a # 2 pencil to fill in your scantron and fill in the circles. The **GREEN** exam is Test **01**. Your PUID and your 4-digit section number must be correct.
3. There are **7** different pages including this cover page. Make sure you have a complete test. Each problem is worth 8 points. There is an additional free 4 points given.
4. Do any necessary work for each problem on the space provided or on the back of the pages of this test booklet. Circle your answers in this test booklet - in case of a lost scantron.
5. After you have finished the exam, hand in your scantron and your test booklet to your recitation instructor.

ACADEMIC DISHONESTY

1. *Do not open the exam booklet until you are instructed to do so.*
2. *Do not leave the exam room during the first 20 minutes or the last 10 minutes of the exam.*
3. *Do not seek or obtain any kind of help from anyone to answer questions on this exam. If you have questions, consult only your instructor.*
4. *Books, notes, calculators, phones, or any other electronic devices are not allowed on the exam. Students should store them in their pockets and/or backpacks.*
5. *After time is called, students have to put down all writing instruments and remain in their seats and wait for the TAs to collect the scantrons and the exams.*
6. *Anyone who violates these instructions will have committed an act of academic dishonesty. Penalties for academic dishonesty can be very severe. All cases of academic dishonesty will be reported immediately to the Office of the Dean of Students.*

I have read and understand the above statements regarding academic dishonesty:

NAME ______________________ **STUDENT ID #** ______________

STUDENT SIGNATURE ______________________________________

TA NAME ____________________ **RECITATION Section #** __________

Liu	Owens	Weld	Yochman
0261	0241	0231	0211
0281	0271	0291	0221

1. If $y = x^2(4 + e^{-2x})$, find the differential of y when $x = 1$ and $dx = \frac{1}{2}$.

A. $dy = 4 + e^{-2}$

B. $dy = \frac{1}{2}\,(4{+}e^{-2})$

C. $dy = 4$

D. $dy = \frac{1}{2}$

E. $dy = 4 + 2e^{-2}$

2. Using linear approximation, approximate the value of $\sqrt{24.2}$.

A. 4.91

B. 4.92

C. 4.94

D. 4.96

E. 5.80

3. A tank has the shape of an inverted circular cone with radius 2 ft and height 8 ft. If water is poured into the tank at a rate of 5 ft/min, find the rate at which the volume of water is increasing when the water is 4 ft deep. (Recall, $V = \frac{1}{3}\pi r^2 h$)

A. 4π ft^3/min

B. 5π ft^3/min

C. 6π ft^3/min

D. $\dfrac{32\pi}{3}$ ft^3/min

E. 20π ft^3/min

4. Let $f(x) = x + \dfrac{4}{x}$. If $M =$ absolute maximum value of f and $m =$ absolute mininum value of f over the closed interval $[1, 4]$, then the product $Mm = ?$

A. 0

B. 10

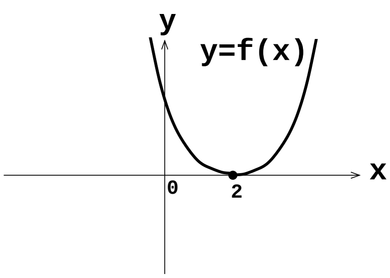
C. 20

D. 25

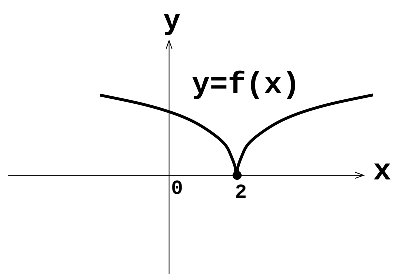
E. 100

5. Which graph below satisfies these conditions: $\begin{cases} f(2) = 0 \\ f'(x) < 0, & \text{when } x < 2 \\ f'(x) > 0, & \text{when } x > 2 \\ f''(x) < 0, & \text{when } x < 2 \text{ and } x > 2 \end{cases}$

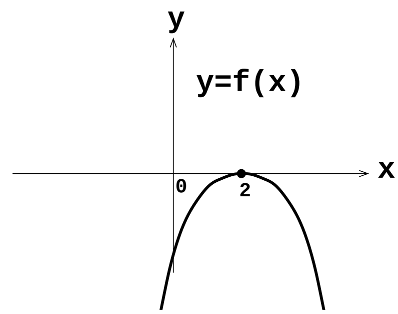
A.



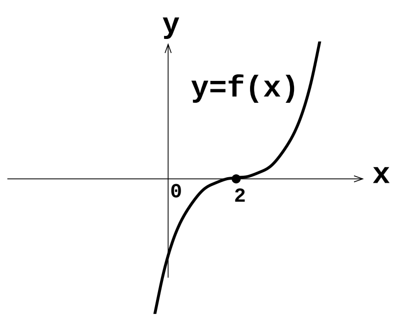
B.



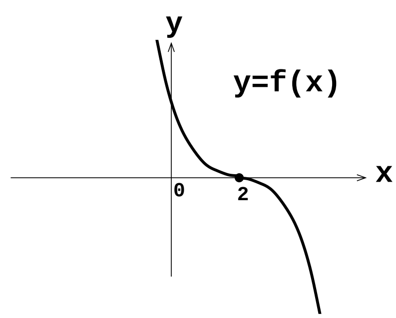
C.



D.



E.



6. The function $f(x) = x^4 - 4x^3 + 5$ is both *decreasing* and also *concave down* on which open interval below?

A. $(0, 3)$

B. $(-\infty, 3)$

C. $(-\infty, 2)$

D. $(0, 2)$

E. $(-\infty, 0)$

7. If f is continuous on $[1, 6]$ and differentiable on $(1, 6)$ with $f(6) = 13$ and $f'(x) \geq 2$ for $1 < x < 6$, what is the largest possible value for $f(1)$?

A. 2

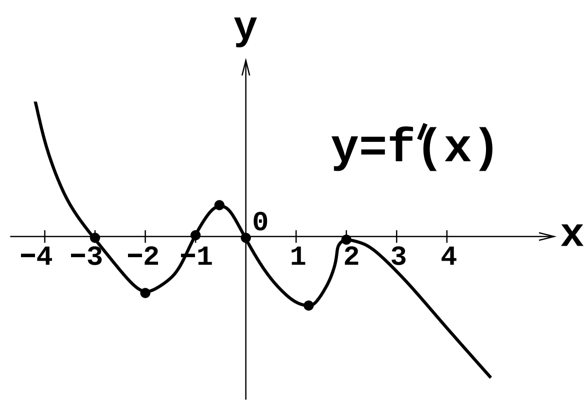
B. 3

C. 8

D. 11

E. 13

8. Given the graph of $f'(x)$, the derivative of $f(x)$, shown below, then the function $f(x)$ has



A. a local max at $\boldsymbol{x = -3}$ and $\boldsymbol{x = 0}$; a local min at $\boldsymbol{x = -1}$

B. a local max at $\boldsymbol{x = -3}$ and $\boldsymbol{x = 2}$; a local min at $\boldsymbol{x = 1}$ and $\boldsymbol{x = -2}$

C. a local max at $\boldsymbol{x = \frac{1}{2}}$; a local min at $\boldsymbol{x = -2}$ and $\boldsymbol{x = 1}$

D. a local max at $\boldsymbol{x = -3}$ and $\boldsymbol{x = -1}$; a local min at $\boldsymbol{x = 1}$ and $\boldsymbol{x = 2}$

E. a local max at $\boldsymbol{x = -1}$ and $\boldsymbol{x = 0}$; a local min at $\boldsymbol{x = -3}$

9. Given that f is a differentiable function and the table below, which statement(s) is/are **TRUE**?

(I) f has a local maximum value at $x = 0$

(II) f has a local maximum value at $x = 2$

(III) f is decreasing at $x = 1$

x	$f(x)$	$f'(x)$	$f''(x)$
0	-2	0	-6
1	3	-2	4
2	5	0	12

A. Only (I)

B. Only (III)

C. Only (II) and (III)

D. Only (I) and (II)

E. Only (I) and (III)

10. Evaluate this limit: $\lim\limits_{x \to \frac{\pi}{2}} \dfrac{3 - 3\sin x}{(x - \frac{\pi}{2})^2}$.

A. 0

B. $-\dfrac{3}{4}$

C. 3

D. $\dfrac{3}{2}$

E. $\dfrac{3}{4}$

11. If $f(x) = x^2 + 3x$ and $[a, b] = [-1, 2]$, find a number c in the interval $(-1, 2)$ so that

$$\frac{f(b) - f(a)}{b - a} = f'(c)\,.$$

A. $c = 0$

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

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

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

E. $c = 1$

12. If $\alpha = \lim_{x \to 0^+} (1 + 2x)^{\frac{3}{x}}$ and $\beta = \lim_{x \to \infty} \frac{2x + 3}{x^2 + 3x}$, then

A. $\alpha = 1, \quad \beta = 0$

B. $\alpha = e^{-3}, \quad \beta = 0$

C. $\alpha = e^{6}, \quad \beta = \infty$

D. $\alpha = e^{3}, \quad \beta = 1$

E. $\alpha = e^{6}, \quad \beta = 0$