

Exam 2 Extra Credit: 15 Points or up to 100%

MATH 142

Summer '18

Version A

Time Due: 6/22/2018 by 5pm

Location Due: Blocker 505E or my Mailbox in Blocker 226 Mail Room

Name (printed): _____

On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work.

Name (signature): _____ **Section:** _____

Instructions:

- PRINT this Extra Credit assignment out.
- There are 17 questions and 8 pages to Exam 2 including the cover sheet. The multiple choice questions are worth 5 points each, and the point values for the problems in the work out section are as indicated.
- If you received FULL CREDIT on a problem in Exam 2, cross out the corresponding problem on this Extra Credit assignment.
- Clearly circle your corrected answer for each multiple choice question you got wrong on Exam 2. Neatly write out the steps you took to arrive at the corrected answer for each multiple choice answer you got wrong on Exam 2. This should easily fit within the space for each problem. I should be able to start at the first line of your work and follow it all the way to the solution.
- Rework every work out problem you lost points on and show all steps. In order to receive full credit on the work out problems, you must neatly show all steps for how you arrived at your solution. I should be able to start at the first line of your work and follow it all the way to the solution at the bottom.
- REMEMBER to clearly show you checked domains where appropriate.
- You must box or circle your final answer in the work out section.
- DO NOT redo any problems that you got completely correct on Exam 2.
- If this document is not STAPLED properly when it is submitted, you will receive ZERO Extra Credit points.
- You must SUBMIT Exam 2 with this Extra Credit.
- If Exam 2 is not submitted with this Extra Credit, you will receive ZERO Extra Credit points. Exam 2 does not have to be stapled to this assignment.
- Your Extra Credit points will be written inside on the first page.

GOOD LUCK!

MULTIPLE CHOICE (5 points each)

1. Calculate $\lim_{x \rightarrow \infty} \frac{5x^2}{4x^2 + 6x + 2}$.

- (a) $\frac{5}{4}$
 - (b) $\frac{5}{10}$
 - (c) $\frac{5}{12}$
 - (d) 0
 - (e) None of the above
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2. Calculate $\frac{d}{dx}[2^{e^x} \cdot 2^{x^3} \cdot 2^x]$

- (a) $2^{e^x+3x^2+1}$
 - (b) $(e^x + 3x^2 + 1) \cdot 2^{e^x+3x^2+1} \cdot \ln(2)$
 - (c) $(e^x + 3x^2 + 1) \cdot 2^{e^x+x^3+x} \cdot \ln(2)$
 - (d) $e^x \cdot 2^{x^3} \cdot 2^x + 3x^2 \cdot 2^{e^x} \cdot 2^x + 2^{e^x} \cdot 2^{x^3}$
 - (e) $e^x \cdot 2^{x^3} \cdot 2^x \cdot \ln(2) + 3x^2 \cdot 2^{e^x} \cdot 2^x \cdot \ln(2) + 2^{e^x} \cdot 2^{x^3} \cdot \ln(2)$
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3. Where are the critical points of $f(x) = \frac{1}{3}x^3 + x^2 - 3x$?

- (a) $x = 1, x = -3$
 - (b) $x = 1, x = -3, x = 0$
 - (c) $x = 0$
 - (d) $x = 1, x = 0$
 - (e) $x = -1$
-

4. Where is $f(x) = e^{-|x|}$ concave up?

- (a) $\{0\}$
 - (b) $(-\infty, \infty)$
 - (c) $(-\infty, 0)$
 - (d) $(0, \infty)$
 - (e) $(-\infty, 0) \cup (0, \infty)$
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5. Where are the inflection points of $f(x) = e^{-x^2}$?

- (a) $x = \frac{1}{\sqrt{2}}, x = -\frac{1}{\sqrt{2}}$
 - (b) $x = 0$
 - (c) $x = \frac{1}{\sqrt{2}}$
 - (d) $x = \frac{1}{\sqrt{2}}, x = -\frac{1}{\sqrt{2}}, x = 0$
 - (e) No inflection points
-

6. Calculate $\lim_{x \rightarrow -\infty} \frac{355x^{231} + 81x^{201} + 2x^{120}}{113x^{230} + 6x^{229} + 2x^{228}}$.

- (a) π
 - (b) $\frac{355}{113}$
 - (c) ∞
 - (d) $-\frac{355}{113}$
 - (e) $-\infty$
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7. Let $f''(x) = \frac{x-10}{(x-4)^{31}}$ and $x=4$ not be in the domain of f . Where is $f(x)$ concave down?

- (a) $(10, \infty)$
 - (b) $(4, 10) \cup (10, \infty)$
 - (c) $(-\infty, 4) \cup (4, 10)$
 - (d) $(-\infty, 10)$
 - (e) $(4, 10)$
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8. Let $f(x) = \frac{1}{2}x^2 + Ax + 8$. Find the value of A that makes $f(x)$ increasing on $(5, \infty)$ and nowhere else.

- (a) $A = 0$
 - (b) $A = -5$
 - (c) $A = 8$
 - (d) $A = 5$
 - (e) Impossible
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9. The derivative of a function f is given by $f'(x) = x^2 + 5x - 6$. Where is $f(x)$ decreasing?

- (a) $(-6, 1)$
 - (b) $(-\frac{5}{2}, \infty)$
 - (c) $(-\infty, -\frac{5}{2})$
 - (d) $(-\infty, -6) \cup (1, \infty)$
 - (e) None of the above.
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10. What value of k makes the following function have no critical point?

$$f(x) = \begin{cases} 2x & x \leq 0 \\ kx & x > 0 \end{cases}$$

- (a) $k = -2$
 - (b) $k = 0$
 - (c) $k = 2$
 - (d) $k = 1$
 - (e) $k = 3$
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WORK-OUT

11. (6 points total) Assume $a < c < b$ and (a, b) is in the domain of $f(x)$.

State whether the point is a location of a relative min, relative max, or neither.

- (a) $f'(c) = 0, f''(c) > 0$ _____
 - (b) $f'(c) = 0, f''(c) < 0$ _____
 - (c) $f'(c) = 0$, on the interval (a, c) $f'(x) > 0$, on the interval (c, b) $f'(x) < 0$ _____
 - (d) $f'(c) = 0$, on the interval (a, c) $f'(x) < 0$, on the interval (c, b) $f'(x) > 0$ _____
 - (e) $f'(c) = 0$, on the interval (a, c) $f'(x) < 0$, on the interval (c, b) $f'(x) < 0$ _____
 - (f) $f'(c) = 0$, on the interval (a, c) $f'(x) > 0$, on the interval (c, b) $f'(x) > 0$ _____
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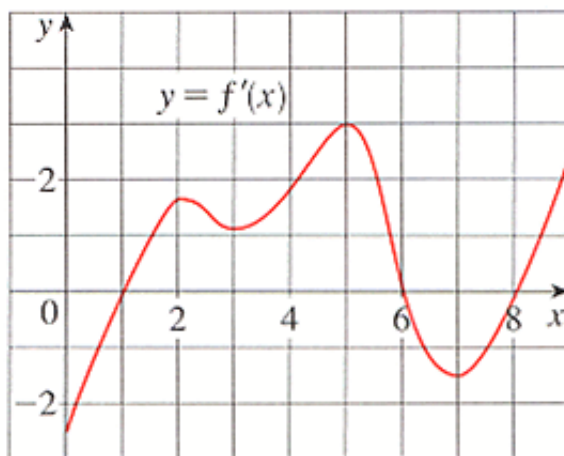
12. (8 points) If $30,000 \text{ cm}^2$ of material is available to make a box with a square base and an open top, find the largest possible volume of the box.

13. (7 points) Find the relative extrema of $f(x) = x^2e^{5x}$ and classify them as relative mins or maxes. Show your work.

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14. (7 points) Find the critical points of $f(x) = \frac{1}{x^2}$. Where is $f(x)$ increasing and where is $f(x)$ decreasing? Use interval notation.
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15. (7 points) Find the absolute min and absolute max of $f(x) = 6x^2 - 36x + 1000$ on the open interval $(-1, 9)$. If the absolute min or absolute max doesn't exist, write DNE.

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16. (8 points) Use the given graph of the derivative f' of a continuous function f over the interval $(0, 9)$ to find the following



State your answers in interval notation if appropriate.

- (a) Where are the inflection points? _____
- (b) Where is f concave up? _____
- (c) Where is f concave down? _____
- (d) Where are the relative extrema of f ? _____
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17. (7 points) Calculate the second derivative of $\frac{x^2}{4+2x}$. You do not have to simplify your solution.
