**MA123 — Elem. Calculus** Spring 2015
Exam 2 2015-03-12

**Name:** _____ **Sec.:** _____

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**(a)** b c d e

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**GOOD LUCK!**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **3.** | a | b | c | d | e | **12.** | a | b | c | d | e |
| **4.** | a | b | c | d | e | **13.** | a | b | c | d | e |
| **5.** | a | b | c | d | e | **14.** | a | b | c | d | e |
| **6.** | a | b | c | d | e | **15.** | a | b | c | d | e |
| **7.** | a | b | c | d | e | **16.** | a | b | c | d | e |
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| **10.** | a | b | c | d | e | **19.** | a | b | c | d | e |
| **11.** | a | b | c | d | e | **20.** | a | b | c | d | e |

**For grading use:**

| Multiple Choice | | Short Answer |
|---|---|---|
| | | |
| (number right) | (5 points each) | (out of 10 points) |

| | |
|---|---|
| **Total** | |
| | **(out of 100 points)** |

**Short Answer Questions**

*Write your answers on this page.*

*You must show proper, logical, sensible and legible work to be sure you will get full credit.*

1. Find the **derivative** of $f(x) = e^{\sqrt{3x+14}}$. You do **not** need to simplify your answer.

Final answer: _____

2. Let $f(x) = (x+4)^2 \cdot g(x)$. If $g(-1) = -2$ and $g'(-1) = 4$, find $f'(-1)$.

Final answer: _____

**Name:** _____

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**Multiple Choice Questions**

*Show all your work on the page where the question appears.*
*Clearly mark your answer both on the cover page on this exam*
*and in the corresponding questions that follow.*

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3. Find the derivative, $f'(x)$, if $f(x) = \sqrt{4x^3 + 5x^2 + 6x + 2}$.

**Possibilities:**

(a) $(1/2)(4x^3 + 5x^2 + 6x + 2)(12x^2 + 10x + 6)$

(b) $(1/2)(4x^3 + 5x^2 + 6x + 2)^{-1/2}(12x^2 + 10x + 6)$

(c) $(1/2)(4x^3 + 5x^2 + 6x + 2)^{1/2}$

(d) $\sqrt{12x^2 + 10x + 6}$

(e) $\dfrac{\sqrt{12x^2 + 10x + 6}}{\sqrt{4x^3 + 5x^2 + 6x + 2}}$

---

4. Find the derivative, $f'(x)$, if $f(x) = e^{2x^3+6x^2+7x}$.

**Possibilities:**

(a) $\dfrac{6x^2 + 12x + 7}{2x^3 + 6x^2 + 7x}$

(b) $\ln(2x^3 + 6x^2 + 7x)$

(c) $(6x^2 + 12x + 7)e^{2x^3+6x^2+7x}$

(d) $(6x^2 + 12x + 7)e^x$

(e) $e^{6x^2+12x+7}$

---

5. For the function $f(x) = 2x^3 + 4x^2 + 3x + 1$, find the equation of the tangent line to graph of $f$ at $x = 3$.

**Possibilities:**

(a) $y = x^3 + 17$

(b) $y = 100$

(c) $y = 100x - 219$

(d) $y = 81x + 100$

(e) $y = 81x - 143$

---

6. Suppose $F(x) = g(x) \cdot h(x+2)$. If $g(0) = 5$, $g'(0) = 6$, $h(0) = 8$, $h'(0) = 9$, $h(2) = 3$, and $h'(2) = 7$, find $F'(0)$.

**Possibilities:**

(a) 88

(b) 102

(c) 38

(d) 53

(e) 174

---

7. Suppose $g(5) = -9$ and $g'(5) = 7$. Find $F'(5)$ if

$$F(x) = \frac{g(x)}{x^2}$$

**Possibilities:**

(a) $\frac{53}{25}$

(b) $\frac{53}{5}$

(c) $\frac{53}{125}$

(d) $\frac{7}{5}$

(e) $-\frac{53}{125}$

---

8. Suppose $F(x) = (g(x))^5 + 7$. If $g(2) = 9$, $g'(2) = 13$, and $g''(2) = 3$, then find $F'(2)$.

**Possibilities:**

(a) $(5)(9^4) + 7$

(b) 3

(c) $13^5 + 7$

(d) $(5)(9^4)(13)$

(e) $9^5 + 7$

---

9. If $f(x) = \dfrac{8}{x+5}$ then choose the simplified form of $\frac{f(x+h)-f(x)}{h}$:

**Possibilities:**

(a) $\dfrac{16x+80+8h}{(x+h+5)(x+5)(2x+h)}$

(b) $\dfrac{hx^2+10hx+25h-8}{(x+5)^2}$

(c) $-\dfrac{8}{(x+h+5)(x+5)}$

(d) $\dfrac{8}{(x+h+5)(x+5)}$

(e) $-\dfrac{8}{(x+h+5)^2}$

---

10. Find the derivative, $f'(x)$, if $f(x) = (6+9x)e^{2+9x}$.

**Possibilities:**

(a) $(63+81x)e^{2+9x}$

(b) $(9)e^9$

(c) $(81)e^9$

(d) $\dfrac{9}{2+9x}$

(e) $(9)e^{2+9x}$

---

11. Suppose $F(x) = \ln(g(x))$. If $g(2) = 5$, $g'(2) = 3$, and $g''(2) = 11$, then find $F'(2)$.

**Possibilities:**

(a) $\ln(11)$

(b) $5/\ln(3)$

(c) $\ln(5)/3$

(d) $5/3$

(e) $3/5$

---

12. For the function $f(x) = \begin{cases} x^2 - 9 & x < 10 \\ \sqrt{x+7} & 10 \le x < 20 \\ x^3 - 5 & 20 \le x \end{cases}$, find the equation of the tangent line to the graph of $f$ at $x = 18$.

**Possibilities:**

(a) $y = 5x - \frac{199}{10}$

(b) $y = 36x - 333$

(c) $y = 315x - 1224$

(d) $y = \frac{1}{10}x + \frac{16}{5}$

(e) $y = 972x - 11669$

---

13. Find the derivative, $f'(x)$, if $f(x) = (4 + 7x)\ln(8 + 5x)$.

**Possibilities:**

(a) $\dfrac{7}{8+5x}$

(b) $7 + \dfrac{5}{8+5x}$

(c) $1/x$

(d) $\dfrac{12}{8+5x}$

(e) $(7)\ln(8+5x) + \dfrac{20+35x}{8+5x}$

---

14. For the function $f(x) = \ln(4x^2 + 7x + 6)$, find the equation of the tangent line to graph of $f$ at $x = 0$.

**Possibilities:**

(a) $y = 3x + \ln(6)$

(b) $y = x^3 + 17$

(c) $y = \ln(6)$

(d) $y = \frac{7}{6}x + \ln(2) + \ln(3)$

(e) $y = x\ln(2) + x\ln(3) + \frac{7}{6}$

---

15. If $f(x) = 7x^2 + 9x$ then find the second derivative $f''(x)$:

**Possibilities:**

(a) 6

(b) 14

(c) $28x^2$

(d) $14x + 16$

(e) $14x + 9$

---

16. If $f(x) = (16x + 35)^{28}$ then $f''(x) =$

**Possibilities:**

(a) $28(27)\,(16x + 35)^{26}\,(16)^2$

(b) $28^2\,(16)^{28}\,(16x + 35)$

(c) $28(27)16^{26}$

(d) 0

(e) $28\,(16x + 35)^{27}$

---

17. Find the derivative, $f'(x)$, of $f(x) = \frac{1}{x^8}$

**Possibilities:**

(a) $-8x^{-7}$

(b) $1/(8\,x^7)$

(c) $-8x^{-9}$

(d) $8x^7$

(e) $1/(8\,x^9)$

---

18. If an amount of $x$ dollars is invested at 2% interest compounded continuously, and at the end of 5 years the value of the investment is \$3000, find $x$.

**Possibilities:**

(a) \$2714.51

(b) \$3315.51

(c) \$300

(d) \$2000

(e) \$588.11

---

19. The half-life of cadmium-109 is 1.267 years. If a sample has a mass of 800 g, find the mass (in g) that remains after 2 years.

**Possibilities:**

(a) 241.07 g

(b) 515.69 g

(c) 572.99 g

(d) 2389.33 g

(e) 267.86 g

---

20. Find the maximum of $g(t) = (t-3)^2 + 4$ on the interval $[0, 5]$

**Possibilities:**

(a) 13

(b) 3

(c) 8

(d) 4

(e) 16

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