David Royster **MA113F20**

Assignment Exam04 due 12/04/2020 at 08:00pm EST

---

1. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem02.pg`

A ball is thrown up in the air so that its height at time t is $h(t) = -5t^2 + 40t$ meters. Find the velocity when the ball is at its greatest height.

- A. -35 meters per second
- B. -40 meters per second
- C. 40 meters per second
- D. 0 meters per second
- E. 35 meters per second

---

2. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem04.pg`

Find the tangent line to the curve $2x^2 + 3y^2 = 30$ at the point where $x = 3$ and the slope is positive.

- A. $y = \frac{1}{2}x - \frac{7}{2}$
- B. $y = x + 5$
- C. $y = x - 5$
- D. $y = 2x - 8$
- E. $y = \frac{1}{2}x + \frac{7}{2}$

---

3. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem05.pg`

A population satisfies $P' = kP$, $P(0) = 2000$ and $P(10) = 6000$. Give the value of k rounded to two decimal places.

- A. $k = 0.11$
- B. $k = 0.09$
- C. $k = 0.15$
- D. $k = 0.17$
- E. $k = 0.13$

---

4. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem06.pg`

An object is moving along a line so that its velocity at time t is $v(t) = 3t^2 - 4t$ meters/second. Find the change in position between $t = 1$ and $t = 3$ seconds. Assume that displacement to the right is positive.

- A. 10 meters to the right
- B. 12 meters to the right
- C. 10 meters to the left
- D. 8 meters to the left

- E. 14 meters to the right

---

5. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem07.pg`

Suppose that $f(x) = \sqrt{9+x}$. Find a second degree Taylor polynomial function $p(x)$ so that $p(0) = f(0)$, $p'(0) = f'(0)$ and $p''(0) = f''(0)$.

- A. $p(x) = 3 + \frac{1}{3}x - \frac{1}{108}x^2$
- B. $p(x) = 3 + \frac{1}{6}x - \frac{1}{108}x^2$
- C. $p(x) = 3 + \frac{1}{18}x - \frac{1}{108}x^2$
- D. $p(x) = 3 + \frac{1}{3}x - \frac{1}{54}x^2$
- E. $p(x) = 3 + \frac{1}{6}x - \frac{1}{216}x^2$

---

6. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem08.pg`

If f and g are continuous functions with $f(3) = 3$ and $\lim_{x \to 3}[5g(f(x)) - f(x)g(x)] = 4$, find $g(3)$.

- A. 2
- B. 3
- C. 1
- D. 5
- E. 4

---

7. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem10.pg`

Find the value of B such that the function

$$f(x) = \begin{cases} -x^2 + 3 & x \leq 1 \\ -x + B & x > 1 \end{cases}$$

is continuous.

- A. 1
- B. -3
- C. 0
- D. 3
- E. -1

---

8. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem11.pg`

Find the horizontal asymptote of $f(x) = \dfrac{2e^{-2x} + 5}{e^{x+1}}$.

- A. $y = 0$

- B. $y = 5$
- C. $y = \frac{2}{e}$
- D. $y = 2$
- E. Does not exist.

---

9. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem12.pg`

The displacement (in meters) of a particle moving in a straight line is given by $s(t) = t^3 - 8t + 10$ where t is measured in seconds. Find the instantaneous velocity when $t = 2$.

- A. 4 meters per second
- B. 10 meters per second
- C. 8 meters per second
- D. 5 meters per second
- E. 2 meters per second

---

10. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem13.pg`

Let $f(x) = \frac{1}{3}x^3 - 4x$ for $-6 \leq x \leq 3$. Find the x coordinates where f has its absolute minimum value and absolute maximum value.

- A. The absolute maximum is at $x = -2$ and the absolute minimum is at $x = 2$.
- B. The absolute maximum is at $x = -2$ and the absolute minimum is at $x = -6$.
- C. The absolute maximum is at $x = 3$ and the absolute minimum is at $x = -6$
- D. The absolute maximum is at $x = 2$ and the absolute minimum is at $x = -6$.
- E. The absolute maximum is at $x = 3$ and the absolute minimum is at $x = 2$.

---

11. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem14.pg`

Evaluate the limit $\lim_{x\to 0} \frac{e^{2x} - 1}{x^3 + x}$.

- A. $\frac{1}{3}$
- B. 1
- C. 2
- D. ∞
- E. $\frac{2}{3}$

---

12. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem16.pg`

Evaluate the indefinite integral $\int \frac{2}{x} + e^{-x} dx$.

- A. $2\ln|x| + e^{-x} + C$
- B. $2 - e^{-x} + C$
- C. $2x - e^{-x} + C$

- D. $x^2 + e^{-x} + C$
- E. $2\ln|x| - e^{-x} + C$

---

13. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem17.pg`

Let $f(x) = \int_0^{x^2} \ln(1+t)dt$. What is $f'(x)$?

- A. $\ln(1+x^2)$
- B. $x^2\ln(1+x)$
- C. $2x\ln(1+x)$
- D. $\frac{1}{1+x}$
- E. $2x\ln(1+x^2)$

---

14. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem18.pg`

Let $f(x) = xe^x$. What is the linearization of f at $x = 0$?

- A. $L(x) = x$
- B. $L(x) = x+1$
- C. $L(x) = 0$
- D. $L(x) = (x+1)e^x$
- E. $L(x) = 1$

---

15. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem19.pg`

Compute $\int_{-1}^{2} \sqrt{x+2}dx$.

- A. 2
- B. 7
- C. $14/3$
- D. $-1/4$
- E. $21/2$

---

16. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem20.pg`

Let f be a differentiable function with $f(\pi/2) = 1$ and $f'(\pi/2) = 3$ and suppose that $h(x) = \cos(x)f(x)$. Find $h'(\pi/2)$.

$h'(\pi/2) =$ __________

---

17. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem21.pg`

Find $\int_0^6 f(x)dx$ if

$$f(x) = \begin{cases} 2x, & x < 4 \\ 6, & 4 \leq x \end{cases}$$

$\int_0^6 f(x)dx =$ __________

18. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem22.pg`

Find the value of $\lim_{x\to 5} \frac{x^2+20x-125}{x^2-5x}$.

$\lim_{x\to 5} \frac{x^2+20x-125}{x^2-5x} =$ __________

19. **(5 points)** `local/GlobalPandemic/Exam04/Ma113_Exam04_problem23.pg`

The length of a rectangle is increasing at the rate of 4 cm/sec while its width increases at the rate of 10 cm/sec. Find how fast the area of the rectangle is changing when the length is 4 centimeters and the width is 3 centimeters.

__________ cm^2/sec

20. **(5 points)** `local/GlobalPandemic/Exam04/MA113_Exam04_problem24.pg`

Let f be a differentiable function with $f(1) = 6$ and $f'(1) = 4$. If $h(x) = f(e^{2x})$, find $h'(0)$.

$h'(0) =$ __________