

Student: \_\_\_\_\_  
Date: \_\_\_\_\_

Instructor: Oscar Bandtlow  
Course: MTH4100 / MTH4200 - Calculus I - Assignment: Final exam (pre-scrutiny)  
2022/23

1. Evaluate the integral.

$$\int 7y^2 \sqrt{8 - 7y^3} \, dy$$

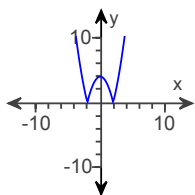
$$\int 7y^2 \sqrt{8 - 7y^3} \, dy = \boxed{\phantom{000}}$$

ID: 5.5.20

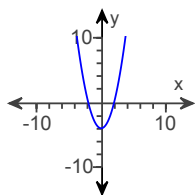
2. Graph the function.

$$y = |x^2 - 4|$$

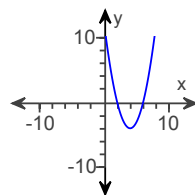
A.



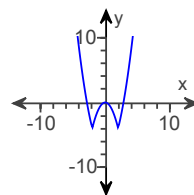
B.



C.



D.



ID: 1.2-44

3. Find  $y''$ .

$$y = 2 \cot\left(\frac{x}{9}\right)$$

A.  $\frac{4}{81} \csc^2\left(\frac{x}{9}\right) \cot\left(\frac{x}{9}\right)$

B.  $-\frac{2}{9} \csc^2\left(\frac{x}{9}\right)$

C.  $-4 \csc\left(\frac{x}{9}\right)$

D.  $4 \csc^2\left(\frac{x}{9}\right) \cot\left(\frac{x}{9}\right)$

ID: 3.6-23

4. Find the function  $y(x)$  satisfying  $\frac{dy}{dx} = 7x^{-10/11}$  and  $y(-1) = -4$ .

The function  $y(x)$  satisfying  $\frac{dy}{dx} = 7x^{-10/11}$  and  $y(-1) = -4$  is  $y(x) = \boxed{\phantom{000}}$ .

ID: 4.7.75

5. Determine whether the improper integral converges or diverges.

$$\int_1^{\infty} \frac{\sqrt{5x+7}}{x^2} dx$$

- Converges  
 Diverges

ID: 8.8-32

6. Express the given quantity in terms of **sin** x or **cos** x.

$$\cos\left(\frac{7\pi}{2} + x\right)$$

- A. **cos** x  
 B. **sin** x  
 C. **cos** x + **sin** x  
 D. **- sin** x

ID: 1.3-29

7. Evaluate the integral using integration by parts.

$$\int x^4 e^{-2x} dx$$

$$\int x^4 e^{-2x} dx = \boxed{\phantom{000000}}$$

ID: 8.2.16

8. Evaluate the improper integral or state that it is divergent.

$$\int_3^{\infty} \frac{dt}{t^2 - 2t}$$

- A.  $-\frac{1}{2} \ln 3$   
 B.  $\frac{1}{2} \ln 3$   
 C.  $2 \ln 3$   
 D.  $\frac{1}{3} \ln 2$   
 E. The integral is divergent.

ID: 8.8-2

9. Find the average value of the function over the given interval.

$$f(x) = |x| + 6 \text{ on } [-5, 5]$$

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- A. 17
- B.  $\frac{17}{10}$
- C. 85
- D.  $\frac{17}{2}$

ID: 5.3-40

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10. Identify the coordinates of any local and absolute extreme points and inflection points. Graph the function.

$$y = 4x + 8 \cos x, 0 \leq x \leq 2\pi$$

Identify the coordinates of the local maximum points. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The local maximum point(s) is/are .  
(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)
- B. There are no local maximum points.

Identify the coordinates of the local minimum points. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The local minimum point(s) is/are .  
(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)
- B. There are no local minimum points.

Identify the coordinates of the absolute maximum points. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The absolute maximum point(s) is/are .  
(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)
- B. There are no absolute maximum points.

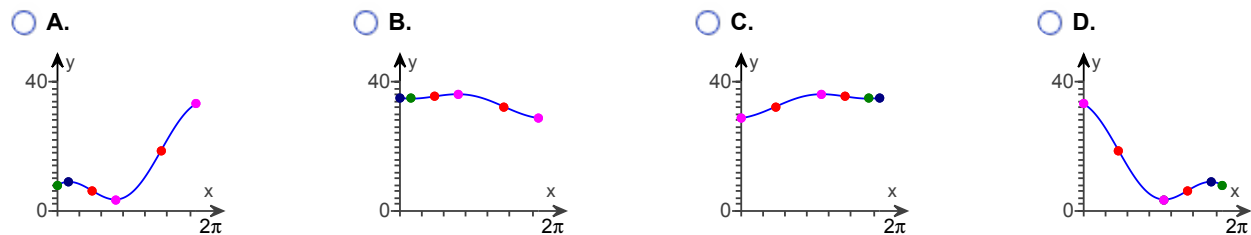
Identify the coordinates of any absolute minimum points. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The absolute minimum point(s) is/are .  
(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)
- B. There are no absolute minimum points.

Find the inflection points. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The inflection point(s) is/are .  
(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)
- B. There are no inflection points.

Choose the correct graph below.



ID: 4.4.25

11. Use the substitution formula to evaluate the integral.

$$\int_0^{\pi/2} \frac{\cos x}{(4 + 4 \sin x)^3} dx$$

- A.  $-\frac{3}{128}$
- B.  $-\frac{15}{128}$
- C.  $\frac{3}{128}$
- D.  $\frac{3}{512}$

ID: 5.6-8

12. Use l'Hôpital's Rule to find the following limit.

$$\lim_{h \rightarrow 0} \frac{e^{7h} - (1 + 7h)}{5h^2}$$

$$\lim_{h \rightarrow 0} \frac{e^{7h} - (1 + 7h)}{5h^2} = \boxed{\phantom{000}} \text{ (Type an exact answer.)}$$

ID: 7.5.44

13. Find the limit.

$$\lim_{x \rightarrow -1^-} (x + 3) \left( \frac{|x + 1|}{x + 1} \right)$$

- A. 4
- B. -2
- C. 2
- D. The limit does not exist.

ID: 2.4-10

14. Find the limit.

$$\lim_{x \rightarrow \infty} \sqrt{x^2 + 10x} - x$$

- A. 5
- B. 10
- C. 0
- D.  $\infty$

ID: 2.6-21

15. Evaluate the integral.

$$\int_1^4 \frac{t^2 + 1}{\sqrt{t}} dt$$

- A.  $\frac{36}{5}$
- B.  $\frac{72}{5}$
- C. 72
- D.  $\frac{144}{5}$

ID: 5.4-4

16. Find the limit and determine if the function is continuous at the point being approached.

$$\lim_{x \rightarrow -2\pi} \sin \left( -\frac{11\pi}{2} \cos(\tan x) \right)$$

- A. The limit is 1 and the function is continuous at the point.
- B. The limit is 1 and the function is not continuous at the point.
- C. The limit is  $-1$  and the function is not continuous at the point.
- D. The limit is  $-1$  and the function is continuous at the point.
- E. The limit does not exist and the function is not continuous at the point.

ID: 2.5-22

17. Evaluate the integral.

$$\int_{-1}^{3/2} \frac{3 dt}{\sqrt{24 - 2t - t^2}}$$

- A.  $\frac{\pi}{6}$
- B.  $\pi$
- C.  $\frac{\sqrt{2}}{2} - \pi$
- D.  $\frac{1}{2}\pi$

ID: 7.6-30

18. Find the derivative of  $y$  with respect to the appropriate variable.

$$y = (2 - 2\theta) \tanh^{-1} \theta$$

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- A.  $\frac{2}{1+\theta} - 2 \tanh^{-1} \theta$
- B.  $\frac{2}{1-\theta} - 2 \tanh^{-1} \theta$
- C.  $\frac{2+2\theta}{1+\theta^2} - 2 \tanh^{-1} \theta$
- D.  $\frac{-2}{1+\theta}$

ID: 7.7-22

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19. Find an equation of the tangent to the curve  $f(x) = 2x^2 - 2x + 1$  that has slope 2.

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- A.  $y = 2x + 1$
- B.  $y = 2x + 2$
- C.  $y = 2x - 1$
- D.  $y = 2x$

ID: 3.1-29

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20. Find the domain and range of the function.

$$g(z) = \frac{-7}{\sqrt{z+1}}$$

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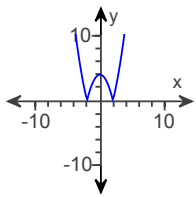
- A. D:  $(-1, \infty)$ , R:  $(-\infty, 0)$
- B. D:  $[1, \infty)$ , R:  $(-\infty, \infty)$
- C. D:  $(-\infty, -1)$ , R:  $(0, \infty)$
- D. D:  $[0, \infty)$ , R:  $(-\infty, \infty)$

ID: 1.1-5

$$1. -\frac{2}{9}(8-7y^3)^{3/2} + C$$


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2.



A.

$$3. A. \frac{4}{81} \csc^2\left(\frac{x}{9}\right) \cot\left(\frac{x}{9}\right)$$


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$$4. 77x^{1/11} + 73$$


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5. Converges

6. B.  $\sin x$ 

$$7. -\left(\frac{1}{2}x^4 + x^3 + \frac{3}{2}x^2 + \frac{3}{2}x + \frac{3}{4}\right)e^{-2x} + C$$


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$$8. B. \frac{1}{2} \ln 3$$


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$$9. D. \frac{17}{2}$$


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10. A. The local maximum point(s) is/are  $(2\pi, 8\pi + 8), \left(\frac{\pi}{6}, \frac{2\pi}{3} + 4\sqrt{3}\right)$ .

(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)

A. The local minimum point(s) is/are  $(0, 8), \left(\frac{5\pi}{6}, \frac{10\pi}{3} - 4\sqrt{3}\right)$ .

(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)

A. The absolute maximum point(s) is/are  $(2\pi, 8\pi + 8)$ .

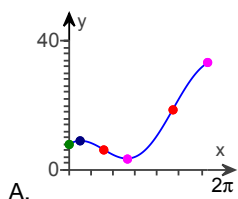
(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)

A. The absolute minimum point(s) is/are  $\left(\frac{5\pi}{6}, \frac{10\pi}{3} - 4\sqrt{3}\right)$ .

(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)

A. The inflection point(s) is/are  $\left(\frac{\pi}{2}, 2\pi\right), \left(\frac{3\pi}{2}, 6\pi\right)$ .

(Type an ordered pair. Use a comma to separate answers as needed. Type an exact answer, using  $\pi$  as needed.)



11. D.  $\frac{3}{512}$

12.  $\frac{49}{10}$

13. B.  $-2$

14. A.  $5$

15. B.  $\frac{72}{5}$

16. A. The limit is 1 and the function is continuous at the point.

17. D.  $\frac{1}{2}\pi$

18. A.  $\frac{2}{1+\theta} - 2 \tanh^{-1}\theta$

19. C.  $y = 2x - 1$

20. A. D:  $(-1, \infty)$ , R:  $(-\infty, 0)$