Student: _____	**Instructor:** Oscar Bandtlow
Date: _____	**Course:** MTH4100 / MTH4200 **-** Calculus **Assignment:** Final exam
	I - 2021/22

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

$$\lim_{x \to \pi/2} \cos(5x - \cos 5x)$$

⚪ **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 0 and the function is not continuous at the point.

⚪ **D.** The limit is 0 and the function is continuous at the point.

⚪ **E.** The limit does not exist and the function is not continuous at the point.

ID: 2.5-21

2. Evaluate the integral.

$$\int 4y^7 \sqrt{1 - 4y^8} \, dy$$

$$\int 4y^7 \sqrt{1 - 4y^8} \, dy = \underline{\hspace{2cm}}$$

ID: 5.5.20

3. Find the domain and range of the function.

$$g(z) = \sqrt{4 - z^2}$$

⚪ **A.** D: $[0, \infty)$, R: $(-\infty, \infty)$

⚪ **B.** D: $[-2, 2]$, R: $[0, 2]$

⚪ **C.** D: $(-2, 2)$, R: $(-2, 2)$

⚪ **D.** D: $(-\infty, \infty)$, R: $(0, 2)$

ID: 1.1-7

4. Find the limit.

$$\lim_{x \to \infty} \sqrt{x^2 + 12x} - x$$

⚪ **A.** 6

⚪ **B.** 0

⚪ **C.** 12

⚪ **D.** ∞

ID: 2.6-21

5. Evaluate the integral.

$$\int_{1}^{4} \left(t + \frac{1}{t} \right)^2 dt$$

○ **A.** $\dfrac{111}{4}$

○ **B.** $\dfrac{365}{12}$

○ **C.** $\dfrac{79}{4}$

○ **D.** $\dfrac{349}{12}$

ID: Instructor-created question

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

$$y = 3\sqrt{3}\,x + 6\cos x,\ 0 \le x \le 2\pi$$

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 π 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 π 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 π 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 π 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 π as needed.)

○ **B.** There are no inflection points.

Choose the correct graph below.

○ **A.**

○ **B.**

○ **C.**

○ **D.**
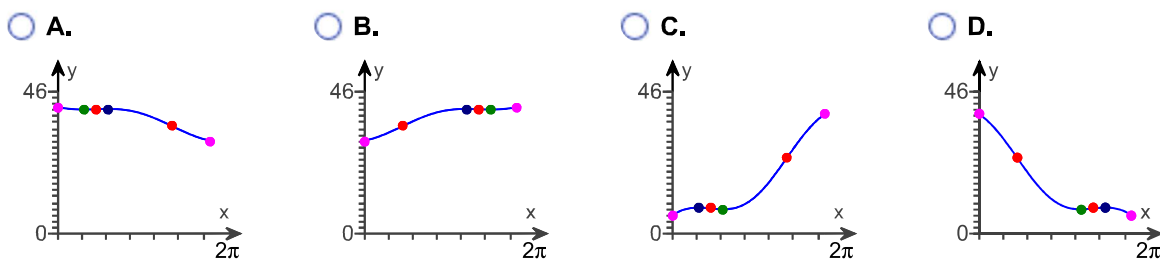
ID: 4.4.25

7. Determine whether the improper integral converges or diverges.

$$\int_{-\infty}^{\infty} \frac{dx}{\sqrt{5x^6 + 1}}$$

○ Diverges
○ Converges

ID: 8.8-33

8. Find the limit.

$$\lim_{x \to -5^-} (x + 1)\left(\frac{|x + 5|}{x + 5}\right)$$

○ **A.** -4
○ **B.** 4
○ **C.** 6
○ **D.** The limit does not exist.

ID: 2.4-10

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

sin $(4\pi - x)$

○ **A.** **sin** x
○ **B.** $-$ **sin** x
○ **C.** **cos** x $-$ **sin** x
○ **D.** **cos** x

ID: 1.3-31

10.

Find an equation of the tangent to the curve $f(x) = \sqrt{x+5}$ that has slope $\dfrac{1}{4}$.

- **A.** $y = \dfrac{1}{4}x + \dfrac{9}{4}$

- **B.** $y = -\dfrac{1}{4}x + \dfrac{9}{4}$

- **C.** $y = \dfrac{1}{4}x - \dfrac{9}{4}$

- **D.** $y = \dfrac{1}{4}x$

ID: 3.1-28

11. Evaluate the integral.

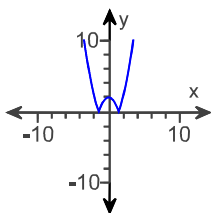$$\int_{-1}^{1/2} \frac{3\,dt}{\sqrt{8-2t-t^2}}$$

- **A.** $\dfrac{\pi}{6}$

- **B.** π

- **C.** $\dfrac{1}{2}\pi$

- **D.** $\dfrac{\sqrt{2}}{2} - \pi$

ID: 7.6-30

12. Graph the function.
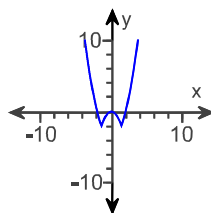
$$y = \left| x^2 - 2 \right|$$
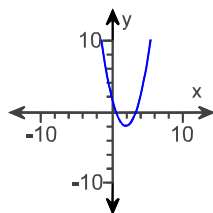
- **A.**
- **B.**
- **C.**
- **D.**
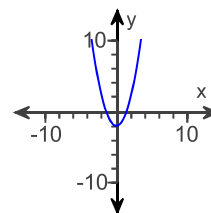

ID: 1.2-44

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

$f(x) = |x| + 6$ on $[-7, 7]$

○ A.

○ B. $\dfrac{19}{14}$

○ C. 19

○ D. $\dfrac{19}{2}$

ID: 5.3-40

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

$$\int_{3}^{\infty} \frac{dt}{t^2 - 2t}$$

○ A. $\dfrac{1}{3}\ln 2$

○ B. $\dfrac{1}{2}\ln 3$

○ C. $2\ln 3$

○ D. $-\dfrac{1}{2}\ln 3$

○ E. The integral is divergent.

ID: 8.8-2

15. Find the derivative of y with respect to the appropriate variable.

$y = (9 - 9\theta)\tanh^{-1}\theta$

○ A. $\dfrac{9}{1+\theta} - 9\tanh^{-1}\theta$

○ B. $\dfrac{9}{1-\theta} - 9\tanh^{-1}\theta$

○ C. $\dfrac{-9}{1+\theta}$

○ D. $\dfrac{9+9\theta}{1+\theta^2} - 9\tanh^{-1}\theta$

ID: 7.7-22

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

$$\lim_{x \to 0} \frac{\sin(x) - x}{4x^3}$$

$\lim\limits_{x \to 0} \dfrac{\sin(x) - x}{4x^3} =$ _____ (Type an exact answer.)

ID: 7.5.16

17. Find f such that $f'(x) = 4x^2 + 9x - 4$ and $f(0) = 8$.

f(x) = _____

ID: 4.7.74