

Name: \_\_\_\_\_

Section: \_\_\_\_\_

Last 4 Digits of Student ID #: \_\_\_\_\_

This exam has twelve multiple choice questions (5 points each), five true/false questions (2 points each), and three free response questions (10 points each). Additional blank sheets are available for scratch work. No books or notes may be used. Turn off your cell phones and do not wear ear-plugs during the exam. You may use a calculator, but not one which has scientific or graphing capabilities.

**On the multiple choice and true/false choice problems:**

1. You must give your final answer in the multiple choice and true/false answer boxes on the front page of your exam. See the "EXAMPLE" row for a correct shading example.
2. Carefully check your answers. No credit will be given for answers other than those indicated in the answer boxes.

**On the free response problems:**

1. Write your solutions neatly in the space below the question (unsupported answers may not receive credit). You are not expected to write your solution next to the statement of the question.
2. Give exact answers, rather than decimal approximations (unless otherwise stated).

**Multiple Choice Answers**

EXAMPLE	A	B	C	D	E
Question					
1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E
13	A	B	C	D	E
14	A	B	C	D	E

**True/False Choice Answers**

Question		
15	T	F
16	T	F
17	T	F
18	T	F
19	T	F

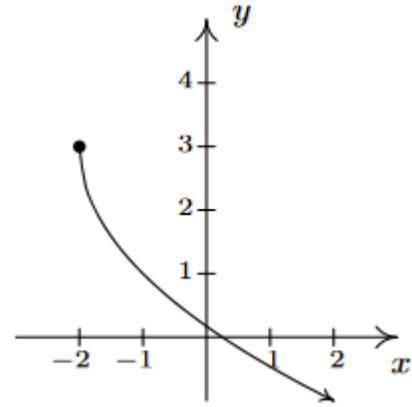
**Exam Scores**

Question	Score	Total
MC		70
TF		10
20		10
21		10
22		10
Total		110

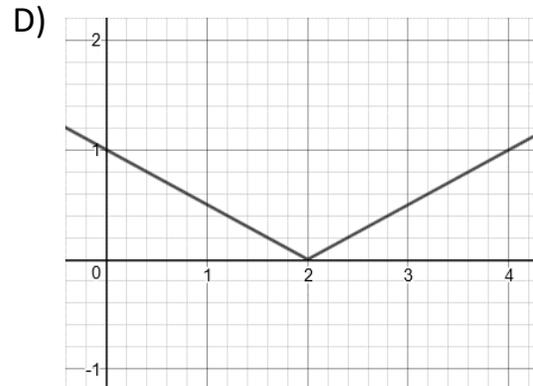
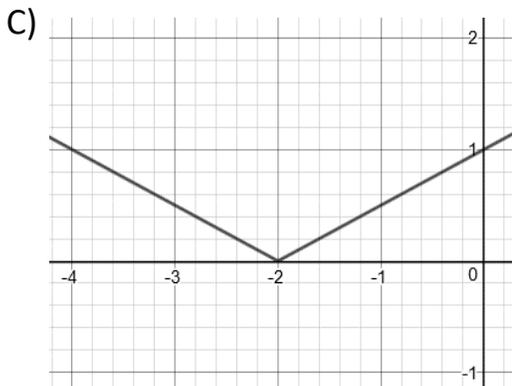
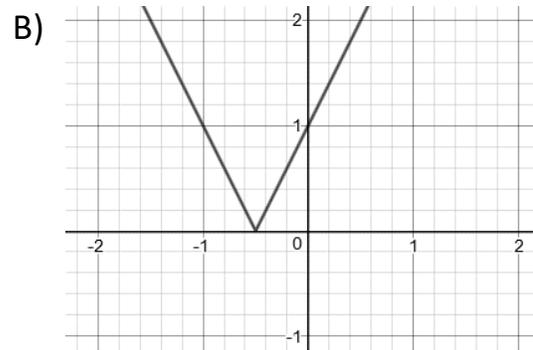
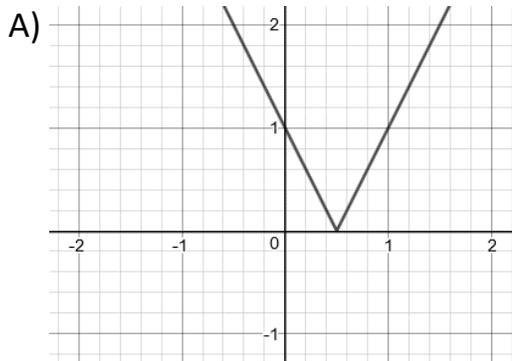
Record the correct answer to the following problems on the front page of this exam.

1. Determine the range of the function whose graph is shown at the right.

- (a)  $(-\infty, 2]$
- (b)  $[3, \infty)$
- (c)  $[-2, \infty)$
- (d)  $(-\infty, 3]$
- (e) None of the other choices.



2. Which of the following matches the graph of  $f(x) = |2x + 1|$ ?



**Record the correct answer to the following problems on the front page of this exam.**

3. Compute the inverse of the one-to-one function  $f(x) = x^5 + 1$ .

(a)  $f^{-1}(x) = (x - 1)^5$

(b)  $f^{-1}(x) = (x + 1)^5$

(c)  $f^{-1}(x) = \sqrt[5]{x - 1}$

(d)  $f^{-1}(x) = \sqrt[5]{x + 1}$

(e) None of the other choices.

4. Compute the remainder when  $x^6 - 9x^3 + 5$  is divided by  $x - 2$ .

(a)  $-11$

(b)  $-3$

(c)  $27$

(d)  $101$

(e) None of the other choices.

5. Compute the value of  $\log_3(\sqrt{3})$ .

(a)  $\frac{1}{2}$

(b)  $2$

(c)  $3$

(d)  $6$

(e) None of the other choices.

6. If  $\sec(\theta) = 4$  and  $\theta$  is in Quadrant I, then compute  $\sin(\theta)$ .

(a)  $\frac{4}{\sqrt{17}}$

(b)  $\frac{\sqrt{15}}{4}$

(c)  $\sqrt{15}$

(d)  $\frac{1}{\sqrt{17}}$

(e) None of the other choices.

Record the correct answer to the following problems on the front page of this exam.

7. The expression  $\cos\left(\theta + \frac{\pi}{2}\right)$  simplifies to which of the following?

- (a)  $\cos(\theta) + 1$
- (b)  $\cos(\theta)$
- (c)  $\sin(\theta)$
- (d)  $-\cos(\theta)$
- (e)  $-\sin(\theta)$

8. Determine the value of  $\arccos\left(-\frac{1}{2}\right)$ .

- (a)  $\frac{\pi}{3}$
- (b)  $\frac{2\pi}{3}$
- (c)  $\frac{5\pi}{6}$
- (d)  $\frac{4\pi}{3}$
- (e) None of the other choices.

9. Determine the value of  $\arcsin\left(\sin\left(\frac{7\pi}{4}\right)\right)$ .

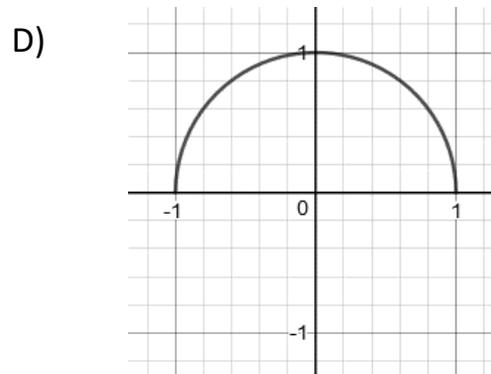
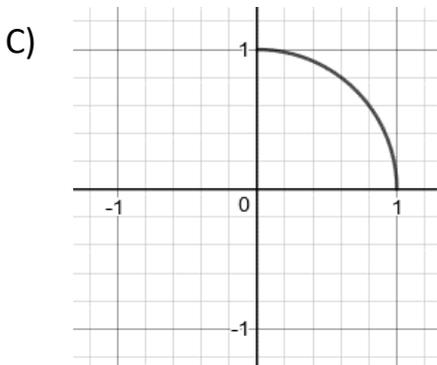
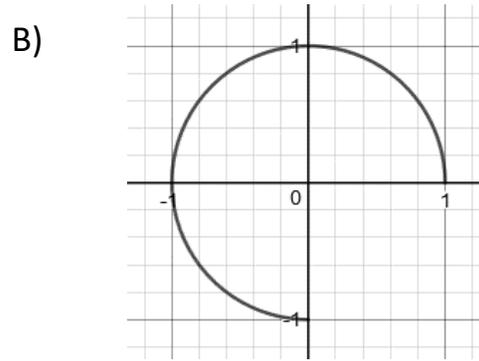
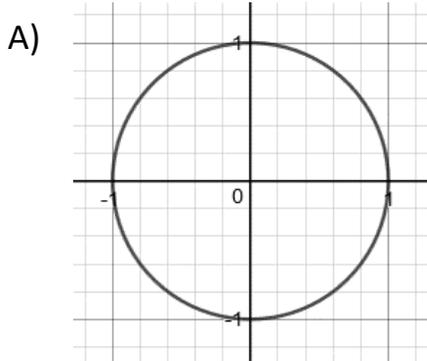
- (a)  $-\frac{\pi}{4}$
- (b)  $\frac{\pi}{4}$
- (c)  $\frac{7\pi}{4}$
- (d)  $-\frac{7\pi}{4}$
- (e) None of the other choices.

10. Determine all the solutions of the equation:  $\cos(x) = 0$ .

- (a)  $x = 2n\pi$ , where  $n$  is any integer
- (b)  $x = n\pi$ , where  $n$  is any integer
- (c)  $x = \frac{\pi}{2} + 2n\pi$ , where  $n$  is any integer
- (d)  $x = \frac{\pi}{2} + n\pi$ , where  $n$  is any integer.
- (e) None of the other choices.

Record the correct answer to the following problems on the front page of this exam.

11. Which of the following matches the graph of the parametric equations  $x = \cos(t)$  and  $y = \sin(t)$  for  $0 \leq t \leq \frac{\pi}{2}$ ?



12. Convert the polar coordinate  $(2, \frac{3\pi}{4})$  into rectangular form.

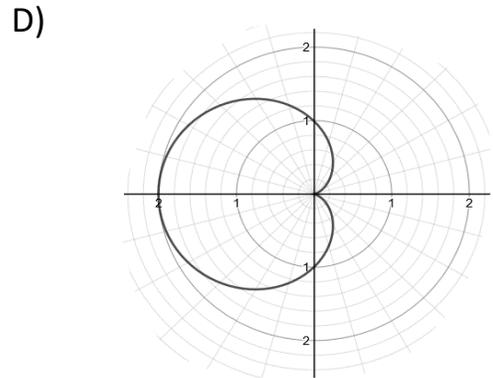
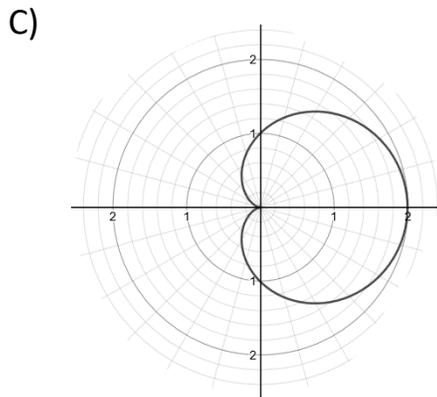
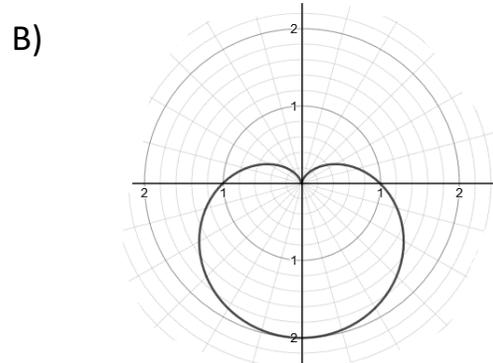
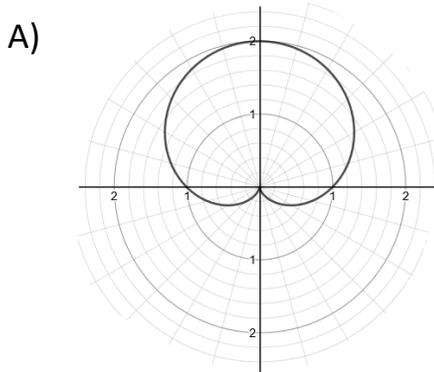
- (a)  $(\sqrt{2}, \sqrt{2})$
- (b)  $(-\sqrt{2}, -\sqrt{2})$
- (c)  $(\sqrt{2}, -\sqrt{2})$
- (d)  $(-\sqrt{2}, \sqrt{2})$
- (e) None of the other choices.

13. Convert the rectangular equation  $x^2 + y^2 - 2y = 0$  into polar form.

- (a)  $r^2 = 2 \cos(\theta)$
- (b)  $r = 2 \cos(\theta)$
- (c)  $r = 2 \sin(\theta)$
- (d)  $r^2 = 2 \sin(\theta)$
- (e) None of the other choices.

Record the correct answer to the following problems on the front page of this exam.

14. Which of the following matches the graph of the polar equation  $r = 1 - \cos(\theta)$ ?



For questions 15-19, determine whether each statement is true or false.

15. The graph of an invertible function has the property where every horizontal line intersects the graph at most once.

16. The domain of  $f(x) = \ln(x)$  is all real numbers.

17. For all real numbers  $u, v > 0$ :  $\log(uv) = \log(u) \log(v)$ .

18. For all real numbers  $\theta$ :  $\cos^2(\theta) = 1 - \sin^2(\theta)$ .

19. The range of  $f(x) = \arccos(x)$  is  $[0, \pi]$ .

**Free Response Questions: Show your work!!**

20. For the function  $f(x) = 1 - 2x$ , compute and simplify the difference quotient:

$$\frac{f(x+h) - f(x)}{h}$$

**Free Response Questions: Show your work!!**

21. Rewrite the following as an algebraic expression of  $u$ . Write your answer in the space provided below. (Hint: Draw a right triangle that contains the angle  $\arctan(u)$ .)

$$\cos(\arctan(u))$$

$$\cos(\arctan(u)) = \underline{\hspace{4cm}}$$

**Free Response Questions: Show your work!!**

22. Solve the following equation for  $\theta$ , giving only the exact solutions on the interval  $[0, 2\pi)$ .  
Write your answers in the space provided below. (Hint: Try factoring.)

$$\sin^2(\theta) = 2 + \sin(\theta)$$

$\theta =$  \_\_\_\_\_