

Start date: 12/15/14

Altered

Instructors: All

Final Deadline: 12/19/14.

1. What is the vertex of the parabola whose equation is  $8y = x^2 - 2x - 7$ .

- a. (1,-7)      b. (1,-8)      c. (1,-1)      d. (0,-7)      e. (-1,-0.5)

2. Find the focus of the parabola whose equation is  $8y = x^2 - 2x - 7$ .

- a. (1,1)      b. (1,-3)      c. (3,-1)      d. (-1,-1)      e. (-1, 1)

3. Let  $R(x) = \frac{x^2-3x+1}{x+2}$ . Find the oblique asymptote if one exists.

- (a)  $-5x + 1$       (b)  $x + 2$       (c)  $x$       (d) 1  
(e)  $x - 5$       (f)  $x - 3$       (g)  $x - 3/2$       (h)  $-3x + 1$   
(i) No oblique asymptote.

4. Solve the inequality:  $\frac{(x+4)(3-x)}{(x-2)^2} < 0$ .

- a.  $(-4,2)$  or  $(2,3)$   
b.  $(-4,2)$  or  $(2,\infty)$   
c.  $(-\infty,-4)$  or  $(2,3)$   
d.  $(-\infty,-4)$  or  $(3,\infty)$

5. Solve the inequality:  $\frac{3x+1}{x+1} \leq 2$ .

- a.  $(-1,1]$   
b.  $[-1,1)$   
c.  $(-\infty,-1)$  or  $[1,\infty)$   
d.  $(-\infty,-1]$  or  $(1,\infty)$

6. If  $2x^2 + 3x - 1$  is divided by  $x + 2$ , then the remainder is

- (a)  $-4$       (b)  $-3$       (c)  $-2$       (d)  $-1$       (e) 0  
(f) 1      (g) 2      (h) 3      (i) 4      (j) 5

7. The polynomial  $2x^3 + x^2 - 2x - 1$  has three rational zeros. Find the three zeros and compute their sum.

- a. -1      b.  $-\frac{1}{2}$       c. 0  
d.  $\frac{1}{2}$       e. 1      f.  $\frac{1}{6}$

8. Form a polynomial with real coefficients of degree two so that  $2 + i$  is a zero.

- a.  $x^2 + 4x + 5$
- b.  $x^2 - 4x + 5$
- c.  $x^2 + 4x - 5$
- d.  $x^2 - 4x - 5$
- e.  $x^2 + 2x - 5$

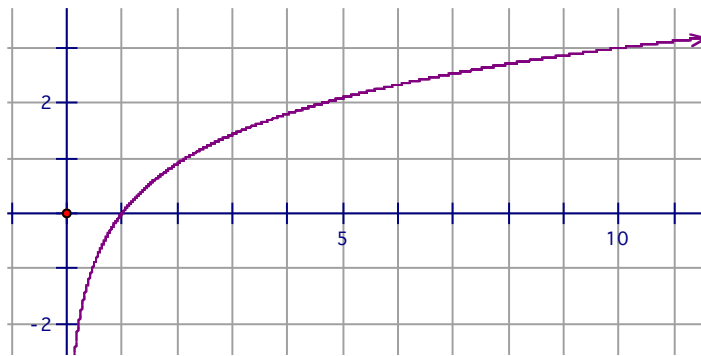
9. Find all solutions to  $x^3 - x^2 + x - 1 = 0$

- a.  $1, 1 + i, 1 - i$
- b.  $1, -1 + i, -1 - i$
- c.  $1, i, -i$
- d.  $-1, 1 + i, 1 - i$
- e.  $-1, -1 + i, -1 - i$
- f.  $-1, i, -i$

10. The equation  $e^{x^2} = \frac{e^x}{e^6}$  has two solutions. Find the sum of the two solutions.

- a. -2
- b. -1
- c. 0
- d. 1
- e. 2
- f. 3

11. Select the function that best represents the given graph.



- a.  $f(x) = 10^x$
- b.  $f(x) = \log x$
- c.  $f(x) = \log x^2$
- d.  $f(x) = \log x^2$
- e.  $f(x) = \log x^2$
- f.  $f(x) = \log(x - 1)^3$

12. Solve the equation  $e^{5x} = 2$  for  $x$ .

- a.  $\ln 5$
- b.  $\ln 2$
- c.  $\ln 5 - \ln 2$
- d.  $\ln 2 - \ln 5$
- e.  $\frac{\ln 2}{5}$
- f.  $\frac{\ln 5}{2}$

13. Use properties of logarithms to find the exact value of the expression  $\log_5 2 \cdot \log_2 125$ .

- a. -2
- b. -1
- c. 0
- d. 1
- e. 2
- f. 3

14. Write the expression as a single logarithm  $2\log_5 4 + 3\log_5 2 + \log_5 8 - \log_5 16$ .

- a.  $\log_5 2$
- b.  $\log_5 4$
- c.  $\log_5 8$
- d.  $\log_5 16$
- e.  $\log_5 32$
- f.  $\log_5 64$

15. How many years would it take an amount of money to double if it is invested at 10% compounded continuously?

- a.  $\ln(2)$
- b.  $2\ln(2)$
- c.  $5\ln(2)$
- d.  $10\ln(2)$
- e.  $20\ln(2)$
- f.  $25\ln(2)$

16. Find the foci of the ellipse  $\frac{(x-1)^2}{7} + \frac{(y+2)^2}{16} = 1$ .

- a. (4,-2) and (-2,-2)                      c. (6,-2) and (-4,-2)  
b. (1,2) and (1,-6)                      d. (1,1) and (1,-5)

17. Solve the system of equations. Find the sum  $x + y + z$ .

$$\begin{cases} x - y = -1 \\ 2x - 3z = -6 \\ 2y + z = 4 \end{cases}$$

- a. 2              b. 3              c. 4              d. 5              e. 6

18. Solve the system of equations. Find the sum  $x + y$ .

$$\begin{cases} \frac{2}{x} + \frac{3}{y} = 2 \\ \frac{8}{x} - \frac{9}{y} = 1 \end{cases}$$

- a. 2              b. 3              c. 4              d. 5              e. 6

19. How many solutions does the following system of equations have?

$$\begin{cases} x^2 + y^2 = 4 \\ y = x^2 \end{cases}$$

- a. 0              b. 1              c. 2              d. 3              e. 4

20. Find the 101<sup>st</sup> term of the arithmetic sequence  $-5, 3, 11, \dots$ .

- a. 795              b. 803              c. 811              d. 819              e. 827

21. Find the arithmetic sum  $3 + 6 + 9 + \dots + 6,000$ .

- a. 6,003,000    b. 12,006,000    c. 9,999,999    d. 202,605    e. 1,000,005

22. Find the geometric sum  $1 + 2 + 2^2 + 2^3 + \dots + 2^{64}$ .

- a.  $2^{65}$               b.  $2^{65} - 1$               c.  $\frac{2^{101} - 1}{2}$               d.  $\frac{2^{101} - 3}{2}$               e.  $\frac{2^{100} - 1}{2}$

23. Find the infinite geometric sum  $1 + \frac{1}{5} + \frac{1}{25} \dots$ .

- a.  $\frac{5}{3}$       b.  $\frac{5}{4}$       c. 1      d.  $\frac{5}{6}$       e.  $\frac{5}{7}$

24. Let  $A = \{1, 2, 3, 4, 8\}$ ,  $B = \{1, 2, 4, 5\}$ , and  $C = \{0, 2, 6, 7, 8, 9\}$ . Find  $(A \cup B) \cap C$ .

- a.  $\{2, 8\}$       b.  $\{0, 2, 6, 7, 8, 9\}$       c.  $\{0, 1, 2, 4, 6, 7, 8, 9\}$       d.  $\{1, 2, 4\}$

25. Find the coefficient of  $x^2$  in  $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^8$ .

- a. 1      b. 8      c. 28      d. 56      e. 70

26. Find the coefficient of  $x^{97}$  in  $(x - 1)^{100}$ .

- a. 161,700      b. -161,700      c. 4,950      d. -4,950      e. 3,921,225

27. How many distinct 4-letter passwords can be formed using the letters  $A, B, C, D, E, F, G$ , if no letter can be used more than once?

- (a) 105      (b) 35      (c) 28      (d) 22      (e) 840      (f) 5040      (g) 24

28. How many different four-person committees can be formed from a group of 12 people?

- a. 990      b. 495      c. 220      d. 210      e. 56

29. You roll a pair of fair dice. What is the probability that the sum of the numbers you roll, will be either a 5 or a 6?

- (a)  $\frac{1}{3}$       (b)  $\frac{11}{12}$       (c)  $\frac{1}{4}$       (d)  $\frac{5}{6}$       (e)  $\frac{1}{6}$       (f)  $\frac{11}{36}$       (g)  $\frac{1}{36}$       (h)  $\frac{1}{18}$

30. Five people randomly choose integers between 1 and 10, inclusive. What is the probability that at least two of them chose the same number to the nearest tenth?

- a. 0.3      b. 0.4      c. 0.5      d. 0.6      e. 0.7      f. 0.8

## Answers

1. C
2. A
3. E
4. D
5. A
6. F
7. B
8. B
9. C
10. D
11. D
12. E
13. F
14. F
15. D
16. D
17. B
18. D
19. C
20. A
21. A
22. B
23. B
24. A
25. C
26. B
27. E
28. B
29. F
30. E