

Math 1151
Fall 2001 Final Exam Problems

This exam contains 12 multiple-choice questions, worth 8 points each, and 9 written problems, worth various amounts of points, for a total of 200 points.

1. The exact value of $\tan(13\pi/4)$ is

A. 1
B. -1
C. 0
D. $\sqrt{2}$
E. undefined

2. The length of an arc subtended by a central angle of 60 degrees on a circle of radius 2 feet is

A. 120 feet
B. 60 feet
C. $2\pi/3$ feet
D. $\pi/3$ feet
E. none of the above

3. The equation $\frac{x^2}{9} + \frac{y^2}{4} = 1$ represents

A. a parabola
B. an ellipse
C. a hyperbola
D. two straight lines
E. none of the above

4. In an arbitrary triangle, if two sides and their included angle are given, how should you best determine the third side?

A. use the Pythagorean Theorem
B. use the Law of Sines
C. use the Law of Cosines
D. use the Triangle Area Formula
E. it is not possible to determine the third side

5. Find the exact value of the infinite sum $\sum_{k=1}^{\infty} 8 \cdot \left(\frac{1}{3}\right)^{k+1}$

A. 12
B. $\frac{8}{3}$
C. $\frac{4}{3}$
D. 8
E. none of the above

6. An airplane flies from Ft. Meyers to Sarasota, a distance of 150 miles, and then turns through an angle of 50 degrees and flies to Orlando, a distance of 100 miles. How far, in miles, is it in a straight line from Ft. Meyers to Orlando?

A. 200.87
B. 350.23
C. 227.56
D. 175.45
E. 250.00

7. Find the standard equation for the hyperbola having vertices at $(0, 1)$ and $(6, 1)$ and an asymptote given by the line $3y + 2x - 9 = 0$.

A. $\frac{(x-1)^2}{9} - \frac{(y-3)^2}{4} = 1$
B. $\frac{(x-1)^2}{4} - \frac{(y-3)^2}{9} = 1$
C. $\frac{(x-1)^2}{9} + \frac{(y-1)^2}{4} = 1$
D. $\frac{(x-3)^2}{9} - \frac{(y-1)^2}{4} = 1$
E. $\frac{(x-3)^2}{4} - \frac{(y-1)^2}{9} = 1$

8. Find the exact value of $\cos(\tan^{-1}(\frac{3}{4}))$.

A. $\frac{4}{3}$
B. $\frac{3}{4}$
C. $\frac{3}{5}$
D. $\frac{4}{5}$
E. none of the above

9. What is the standard form of the complex number $3i + 3i^3 - \frac{3+2i}{1-i}$?

- A. $-(1/2) - (5/2)i$
- B. $-(1/2) + 5i$
- C. $3 - 2i$
- D. $(1/2) + (5/2)i$
- E. $3 + 7i$

10. Which, if any, of the following statements is true?

- A. $\sin \theta - \sin(-\theta) = 0$, for all θ
- B. $\sin^{-1}(\sin \theta) = \theta$, for all θ
- C. the equation $\sin \theta = \frac{1}{2}$, for $0 \leq \theta < 2\pi$, has exactly one solution
- D. the equation $\cos \theta = -2$, for $0 \leq \theta < 2\pi$, has no solutions
- E. none of the above

11. From among the following, choose a polynomial with real coefficients that has the complex zero $1 - i$.

- A. $(x - i)(x - 1 + i)(x - 1 - i)$
- B. $(x - 1)(x - 1 + i)(x - 1 - i)$
- C. $(x - i)(x + i)(x - 1 + i)$
- D. $(x - 1)(x + 1)(x - 1 + i)$
- E. none of the above

12. Which of the following is a complex cube root of $8i$?

- A. $2i$
- B. $2 - i$
- C. $1 + \sqrt{3}i$
- D. $\sqrt{3} + i$
- E. none of the above

13. [12 pts.] Draw a graph of the function $f(x) = 2 \sin\left(\frac{3\pi}{2}x - \frac{1}{3}\right)$

Your graph should be detailed enough to show the correct period, amplitude, and phase shift.

14. [12 pts.] Solve the equation $\sin \theta + \cos \theta = 1$, for $0 \leq \theta < 2\pi$

15. [10 pts.] Find the sum of the arithmetic sequence $5 + 9 + 13 + \dots + 205$.

16. [12 pts.] Find all zeroes (real or complex) of the polynomial $x^3 + x^2 - 2$.

17. [12 pts.] Show the solution set of the following system of inequalities by drawing a graph:

$$x^2 + y^2 \leq 4$$

$$y - x^2 + 2 \geq 0$$

$$y \leq 1$$

18. [12 pts.] Solve the following system of linear equations by the elimination method.

$$x + 2y - z = 3$$

$$2x - 4y + z = -7$$

$$-x + y - 2z = 0$$

19. [12 pts.] Find the center, foci, and vertices of the ellipse whose equation is

$$9x^2 + 4y^2 - 36x - 8y + 4 = 0$$

and graph this ellipse.

20. [10 pts.] If θ is an angle for which $\sin \theta = 3/5$ and $\cos \theta < 0$, find the exact values of each of the remaining five trigonometric functions of θ .

21. [12 pts.] A triangle has a base of 6. The two angles at the base are 30 degrees and 45 degrees. Find the lengths of the other two sides of the triangle, and also find the area of the triangle.