Pre Calculus
Diagnostic Test

Rules

- This diagnostic test consists of questions from all chapters of the course. If the student scores at least 90% in this test, then the student can skip this course.Signup for the next course.
- If the student scored less than 90% of this test, then you should join this course.
- The student should try to answer all of the questions without a calculator and without any help. No time limit and no negative scoring.
- Each question carries 1 point. Total number of answers are 28. You should score at least 25 out of 28 to score 90% or above.
- Answers are provided at end of test. Print this test if possible but keep the answer sheet away until end of test.

1 Find the modulus of the following complex numbers.

$2.2 + 6.4i$

2 Perform the following complex subtractions.

$(9.2 - 1.4i) - (4.4 - 3i)$

3 Perform the following complex divisions.

$$\frac{4.4 - 2.3i}{1.8 - 3.6i}$$

4 Find the slopes $5(y - 1) = -4(x + 2)$

5 Which of the following pairs of lines are parallel?

a) $y = 3x + 2$
   $y = 5x + 2$

b) $y = 5x + 5$
   $y = 5x - 2$

c) $2y = 4x + 1$
   $y = 2x - 10$

6 Evaluate the following linear functions at the domain values that are indicated.

$f(x) = 3.5x - 5.25$ 　　　Find $f(2), f(2.5)$, and $f(-1.5)$

7 Find the interval for **x** that satisfies the following inequalities.

$-3x + 5 \le 10$

8 Find the real roots of the following quadratic equations by factoring.

$y = 4x^2 + 4x - 3$

(9) Find the real roots of the following quadratic equations by completing the square.

$$y = -2x^2 + 10x + 12$$

(10) Use the quadratic formula to find the real or complex roots of the following quadratic equations.

$$y = 2x^2 + 2x + 1$$

(11) $5x^5 + 3x^4 + 2x^2 + 7x$ minus $2x^5 + 3x^4 - 4x^3 + 3x - 5$

(12) Find the following polynomial quotients.

$2x^4 + 11x^3 + 11x^2 - 3x + 4$ divided by $x + 4$

(13) Factor the following polynomials

$$x^3 + 3x^2 + 9x + 27$$

(14) Decompose the following polynomial fractions into partial fractions.

$$\frac{2x^2 + 7x + 3}{x^3 + 2x^2 - x - 2}$$

(15) Simplify the following exponential equations

$$y = \frac{5^3 \cdot (5^2)^{5x}}{5^{x-1}}$$

(16) Simplify the following so that there are no products or powers in the exponentials.

$$y = \frac{e^2 \cdot (e^3)^{4x}}{e^{x+1}}$$

(17) Find the logarithms $\log_3 \frac{1}{9}$

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(18) Convert $315°$ to angles in radians.

(19)

The radius of a circle is 6 inches. An angle of 1.5 radians subtends an arc of length **s** along the circumference of the circle. What is the length of the arc?

(20) Use your calculator to find the inverse sines of -1

(21) If $\tan \alpha = \frac{3}{4}$ and $0° < \alpha < 90°$, find $\tan 2\alpha$, using the double angle formulas.

(22) Find the roots $y = x^3 - 5x^2 - 2x + 24$

(23) Convert (5, 30°) polar coordinates to x-y coordinates.

(24) Convert (4, 3) x-y coordinates to polar coordinates.

The following infinite sequences are defined by their first two terms and a formula for their general term. Write the third, fourth, and fifth terms.

(25) $\frac{1}{2}, \frac{4}{3}, \ldots, \dfrac{n^2}{(n+1)} , \ldots$

(26) $\frac{1}{2}, \frac{1}{4}, \ldots, \dfrac{1}{2^n}, \ldots$

(27) Find the sum of $\displaystyle\sum_{k=1}^{6} 2(k-1)$

(28) Find the binomial expansions. $(x + y)^5$

Answer Keys

1. 6.77
2. 4.8+1.6i
3. 1+0.722i
4. M = -4/5
5. b,c
6. f(2)=1.75,f(2.5)=3.5,f(-1.5)=-10.5
7. x>= -5/3
8. x=½ , x = -3/2
9. X = -1 , x = 6
10. $x = -\frac{1}{2} + \frac{1}{2}i,\ x = -\frac{1}{2} - \frac{1}{2}i$
11. $3x^5 + 4x^3 + 2x^2 + 4x + 5$
12. $2x^3 + 3x^2 - x + 1$
13. $(x + 3)(x^2 + 9)$
14. $\frac{2}{x-1} + \frac{1}{x+1} + \frac{-1}{x+2}$
15. $y = 5^{9x+4}$
16. $y = e^{11x+1}$
17. -2
18. 5.50
19. 9 inches
20. -90° or 270°
21. 3.429
22. x = -2 or x = 3, x = 4
23. $x = 4.33\ \ y = 2.5$

Answer Keys

24. $r = 5 \quad \theta = 36.9°$

25. $\dfrac{9}{4}, \dfrac{16}{5}, \dfrac{25}{6}$

26. $\dfrac{1}{8}, \dfrac{1}{16}, \dfrac{1}{32}$

27. 30

28. $x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + y^5$