

Precalculus: Semester 1 Pretest

Please answer all questions on this test to the best of your ability. Your effort will improve the quality of the data and is greatly appreciated! Some of the items on this test are multiple choice and some are short answer. In either case, please make sure you place your final answer on the provided answer line next to the question.

1. Model the following situation with a linear equation: The gas tank in a truck holds 15 gallons. The truck uses $\frac{4}{7}$ gallon per mile. Write an equation that gives the number of gallons left in the tank after driving x miles. (A-CED-2)

$$\underline{y = 15 - \frac{4}{7}x}$$

2. Find the slope-intercept form of the equation of the line through the point $(0,9)$, perpendicular to the line with the equation $y = 2x + \frac{4}{3}$. (G-GPE-5)

$$\underline{y = -\frac{1}{2}x + 9}$$

3. For the function g given by $g(x) = 9x^2 - \sqrt{3x}$, find $g(5)$. Leave your answer in root form, not as a decimal. (F-IF-2)

$$\underline{225 - \sqrt{15}}$$

4. Find the domain of the function f given by $f(x) = \frac{8x}{x(x^2 - 49)}$ (F-IF-5)

$$\underline{\mathbb{R}, x \neq 0, \pm 7}$$

5. Use your calculator or graphing device to find the relative maximum for the function g given by $g(x) = x^3 + 9x^2 + 24x + 12$. (F-IF-4)

Maximum: $(-4, -4)$

6. Describe the transformation that occurs in the function f given by $f(x) = (x + 7)^2 - 3$ (F-BF-3)

a. Horizontal shift of 7 units to the right and a vertical shift of 3 units downward.

b. Horizontal shift of 7 units to the left and vertical shift of 3 units downward.

c. Horizontal shift of 7 units to the left and vertical shift of 3 units upward.

d. Horizontal shift of 7 units to the right and vertical shift of 3 units upward.

B

7. For the functions f given by $f(x) = x^2 + 2x + 5$ and g given by $g(x) = -1 - 2x$, find $(f + g)(x)$.
(A-APR-1)

$$\underline{x^2 + 4}$$

8. For the functions f given by $f(x) = x^2 + 2x + 5$ and g given by $g(x) = -1 - 2x$, find $(f \circ g)(x)$.
(F-BF-1c)

$$(-1 - 2x)^2 + 2(-1 - 2x) + 5$$

$$4x^2 + 4x + 1 - 2 - 4x + 5$$

$$\underline{4x^2 + 4}$$

9. Find the inverse of the function $y = 4x + 1$ (F-BF-4a)

a. $y = -4x - 1$

b. $y = \frac{1}{4}x - 1$

c. $y = 4x + 1$

d. $y = \frac{1}{4}x - \frac{1}{4}$

$$x = 4y + 1$$

D

10. Find all zeros of the function f given by $f(x) = 2x^3 + 5x^2 - x - 6$, given that $x = -2$ is one of the zeros. (A-APR-3)

$$\begin{array}{r|rrrr} -2 & 2 & 5 & -1 & -6 \\ & & -4 & -2 & 6 \\ \hline & 2 & 1 & -3 & 0 \end{array}$$

$$(2x + 3)(x - 1)$$

$$\underline{x = -2, x = -\frac{3}{2}, x = 1}$$

11. Simplify completely: $(3 + 8i)(2 - 3i)$ (N-CN-2)

a. $6 - 24i$

b. $15 + 7i$

c. $6 + 5i$

d. $5 + 5i$

$$\begin{aligned} &6 + 16i - 9i - 24i^2 \\ &30 + 7i \end{aligned}$$

12. Divide $\frac{8+i}{5+6i}$ and rewrite in standard $(a+bi)$ form. (N-CN-3)

$$\frac{(8+i)(5-6i)}{\cancel{5+6i}(5-6i)} = \frac{40 - 48i + 5i - 6i^2}{25 - 36i^2} = \frac{46 - 43i}{61}$$

13. Solve the function f given by $f(x) = 2x^2 - 5x - 1$. Keep the solution in root form, not as a decimal. (A-REI-4b)

$$\frac{5 \pm \sqrt{25 - 4(2)(-1)}}{2(2)}$$
$$\frac{5 \pm \sqrt{33}}{4}$$

$$\frac{5 \pm \sqrt{33}}{4}$$

14. Find the horizontal asymptotes, if any, of the graph of the function f given by $\frac{2x^2 + 5}{2x^2 + 2x - 2}$. (F-IF-7d)

a. $y = 1$

b. $y = \frac{-5}{2}$

c. $y = 0$

d. No horizontal asymptotes

A

15. Solve for x : $5e^{x-2} = 12$ (F-BF-5)

$$x - 2 = \ln \frac{12}{5}$$

$$x = 2 + \ln \left(\frac{12}{5} \right)$$

$$\underline{2 + \ln \left(\frac{12}{5} \right) = 2.88}$$

16. Evaluate $\log_4 7$ using the change of base formula. (F-LE-4)

a. 1.403

b. 1.75

c. 0.712

d. 0.845

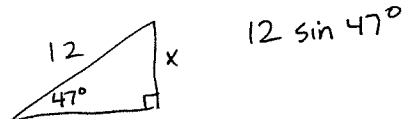
A

17. Evaluate $\sec \frac{\pi}{3}$ using your unit circle. (F-TF-3)



2

18. A 12 foot ladder makes an angle of 47° with the ground as it leans against a house. How far up the house does the ladder reach? (G-SRT-8)



8.78 ft.

19. What is the period of $y = \sin(2x)$? What does the period tell you about the graph? (F-TF-5)

π , length of 1 cycle

20. Use the data in the table to find a quadratic model that best fits the data. (S-ID-1a)

Speed, s	Miles per Gallon, M
30	18
35	20
40	23
40	25
45	25
50	28
55	30
60	29
65	26
65	25
70	25
