

**PreCalc – Last Chance Workout**

1. Use the functions  $f(x) = \frac{x+3}{4}$  and  $g(x) = x^2 + 5x - 3$  to find the following:

- a)  $f^{-1}(x)$       b)  $f^{-1}(7)$       c)  $f(g(x))$       d)  $g(f(x))$       e)  $g(f(-3))$

2. Find the polar coordinates of  $(-4, -4\sqrt{3})$

3. Convert polar to rectangular:  $(-4, \frac{7\pi}{6})$

4. Convert polar to rectangular using decimals:  $(2, 121^\circ)$

5. Find a rectangular equation for  $x$  and  $y$  by eliminating  $t$ :  
(Eliminate the parameter)

$$x = t - 3 \text{ and } y = t^2 - 5$$

6. Identify the amplitude, phase shift, period, and midline.  $y = \cos\left(2x + \frac{\pi}{4}\right) - 3$

7. Write a cosine function that has an amplitude of 3, and a period of  $4\pi$ , and a phase shift of  $2\pi$

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8. If  $\tan(\theta) = \frac{1}{x}$ , find  $\sec(\theta)$

9. Write a recursive formula for the following sequences:

a) 19, 14, 9, 4, .....

b) 60, 20,  $\frac{20}{3}$ , .....

10. Generate the first 5 terms of the given sequence:

$$a_1 = 7 \quad a_n = 4a_{n-1} + 2$$

11. Generate the first 5 terms of the sequence, then write an explicit formula:

$$a_1 = -5 \quad a_n = a_{n-1} - 4$$

12. Generate the first 5 terms, then write a recursive formula:

$$a_n = 3n + 4$$

13. Find the partial sum of the first 20 terms of the sequence below:

6, 14, 22, .....

14. Find the partial sum of the series given below:

$$\sum_{n=1}^5 3 \left(\frac{1}{4}\right)^{n-1}$$

15. Does the series converge or diverge? Find the sum if applicable.

a)  $5 - 10 + 20 - 40 + \dots$

b)  $48 + 12 + 3 + \dots$

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16. Given the circle  $x^2 - 6x + y^2 + 8y = 11$ .

Find the equation of the circle if it was translated 9 units to the right and 6 units up.

17. A vector has magnitude 12 and direction of  $42^\circ$ , find the component form.

18. Find the component form of the vector with the following coordinate points  $(5, -3)$  and  $(6, -1)$ . Then find its magnitude.

19. Erin is pulling a wagon with 25 pounds of force. If the handle of the wagon makes an angle of  $33^\circ$  with the ground, find the horizontal and vertical components of the force.

20. Graph each of the following polar graphs and then find their intersection points.

$$r = 2 - 3\cos\theta \text{ and } r = 2\cos\theta$$

22. Convert the following equation from its rectangular form to its polar form:  
 $(x - 2)^2 + y^2 = 4$

23. Convert the following equation from its polar form to its rectangular form

$$r = \frac{8}{(2\cos\theta + 5\sin\theta)}$$

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**24. Projectile Motion:**

$$x = V \cos(\theta)t \quad y = -\frac{1}{2}t^2 + V \sin(\theta)t + h \quad g = 32 \text{ ft/sec or } 9.8 \text{ m/sec}$$

Ms. McCarthy was trying to hit a home run in baseball. She hit the ball when it was 2.5 feet above the ground with an initial velocity of 140 ft/sec at an angle of 20 degrees.

- a) Write the position equations for this projectile motion.
- b) What is the maximum height of the ball?
- c) How long does it take the ball to hit the ground?
- c) For the ball to be a home run, it must clear an 8 ft fence that is 370 feet away. Will she clear the fence with this hit? Explain.

**25. The speed of a powerboat in still water is 30 mi/h. It is traveling on a river that flows directly south at 8 mi/h.**

- a) The boat heads directly west across the river. What are the resulting speed and direction of the boat? Round answers to the nearest tenth.
- b) At what angle is the boat going to end up off course?

26.  $\sin\left(\cos^{-1}\left(\frac{3}{5}\right)\right) =$  (try a triangle!)

27.  $\cot\left(\csc^{-1}\left(\sqrt{1+y^2}\right)\right) =$  (try a triangle!)