

AP Calculus BC Supplementary Packet – Answers

Answers are provided here for you to double-check yourself. Please report any errors (or email questions) to Mrs. Shak at dshak@vcs.net. Please note that summer homework is due on the first day of class. Credit will not be given if insufficient work is shown.

Pg. 2 Summation and Limits

1. $\frac{15}{2}$ or 7.5

2. $\frac{165}{4}$ or 41.25

3. $S(n) = \frac{n+1}{2n}$ $\lim_{b \rightarrow \infty} S(n) = \frac{1}{2}$

4. $S(n) = \frac{n+5}{2n}$ $\lim_{b \rightarrow \infty} S(n) = \frac{1}{2}$

5. $S(n) = 1 + \frac{n+1}{n} + \frac{(n+1)(2n+1)}{6n^2}$ $\lim_{b \rightarrow \infty} S(n) = 1 + 1 + \frac{1}{3} = \frac{7}{3}$

6. $S(n) = 3 - \frac{n+1}{n}$ $\lim_{b \rightarrow \infty} S(n) = 3 - 1 = 2$

Pg. 3 Parametric Equations

7. $y = (x-1)^2$ parabola pointed up with vertex at (1,0)

8. $\frac{(x-4)^2}{4} + \frac{(y+1)^2}{1} = 1$ Ellipse with center (4, -1) a=2 (major axis), b= 1(minor axis)

Pg. 4 Polar Coordinates and Polar Equations

9. (0,8) 10. $(-1, \sqrt{3})$ 11. $(2\sqrt{2}, 2\sqrt{2})$ 12. (0,0)

Answers may vary here (as there are many equivalent forms of polar coordinates):

13. $(2\sqrt{13}, .983)$ or $(-2\sqrt{13}, .983 + \pi)$ 14. (5, 2.214) or $(-5, 2.214 + \pi)$

$$15. \left(\sqrt{6}, \frac{5\pi}{4} \right) \text{ or } \left(-\sqrt{6}, \frac{\pi}{4} \right)$$

$$16. \left(\sqrt{10}, 2\pi - .322 \right) \text{ or } \left(-\sqrt{10}, \pi - .322 \right)$$

Pg. 5 Convert rectangular equation to polar form:

$$17. r = 3$$

$$18. 3r \cos \theta - r \sin \theta + 2 = 0 \quad (\text{or other equivalent forms})$$

$$19. r^2 \sin^2 \theta - 8r \cos \theta - 16 = 0 \quad (\text{or other equivalent forms})$$

Pg. 5 Convert polar to rectangular form:

$$20. \frac{(y-2)^2}{4} + \frac{x^2}{4} = 1$$

$$21. y = \frac{1}{\sqrt{3}}x$$

$$22. 2\sqrt{x^2 + y^2} - 3y = 6 \quad (\text{and other equivalent forms ... can rewrite this to standard form for hyperbola, but not too concerned about the algebra required to do that}).$$

Pg. 6 Sketch Polar Graph by Hand

23. Rose petal graph with 3 petals

(To graph by hand, make a chart of (theta, r) with theta having increments of $\pi/6$... You see r going from 2 to 0 to -2, etc...)

24. Doublecheck by graphing this with your TI calculator in polar mode

(To graph this by hand, make a chart of (theta, r) with theta starting at 0, and increasing by increments of $\pi/2$.)

25. Cardioid

- In semester 2, we will discuss how to manually graph these polar graphs without a calculator. If you had a lot of trouble with these, don't despair, I will reteach. I do find that most students coming into calculus depend on the calculator to graph polar graphs.