



AP CALCULUS SUMMER PACKET

1) Simplify  $\frac{\sqrt[7]{x^9}}{\sqrt[5]{x^6}}$ . Express your answer using a single radical.

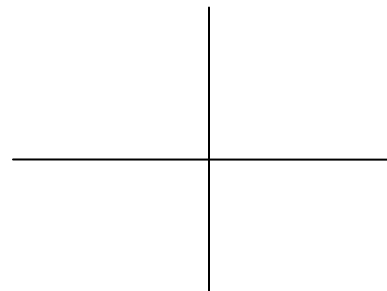
2). Factor completely.  $6x^3 - 17x^2 + 5x$

3) Determine the range and the zeros of:  $f(x) = 13 - 20x - x^2 - 3x^4$ .

4) Find the equation of the line through  $(-2, 7)$  and  $(3, 5)$  in point slope form.

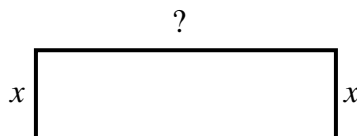
5) Solve the equation both algebraically and graphically.

$$|4x - 3| = 5\sqrt{x + 4}$$



6) Rewrite the expression  $\log_5(x + 3)$  into an equivalent expression using only natural logarithms

8) Three sides of a fence and an existing wall form a rectangular enclosure. The total length of a fence used for the three sides is 240 ft. Let  $x$  be the length of two sides perpendicular to the wall as shown. Write an



equation of area  $A$  of the enclosure as a function of the length  $x$  of the rectangular area as shown in the above figure. The find value(s) of  $x$  for which the area is  $5500 \text{ ft}^2$

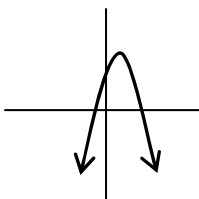
9) Let  $f(x) = \sqrt{x-3}$  and  $g(x) = x^2 + 1$ . Compute  $(g \circ f)(x)$ , state its domain in interval notation.

10) Let  $f(x) = \frac{3x+7}{x-2}$ . Find  $f^{-1}(x)$ , the inverse of  $f(x)$

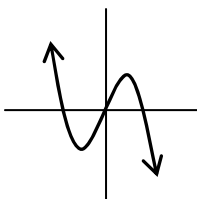
11) Find an equation for the parabola whose vertex is  $(2, -5)$  and passes through  $(4, 7)$ . Express your answer in the standard form for a quadratic.

12) Which of the following could represent a complete graph of  $f(x) = ax - x^3$ , where  $a$  is a real number?

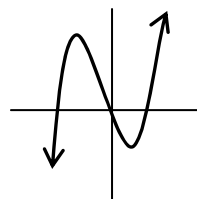
A.



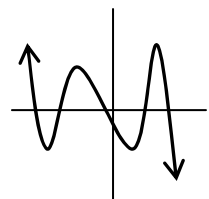
B.



C.

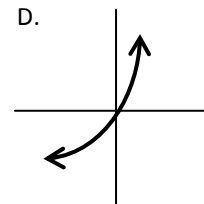
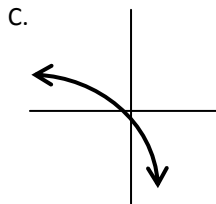
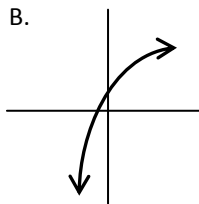
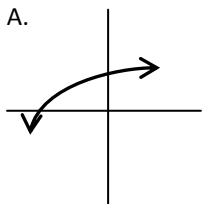


D.



13) Find a degree 3 polynomial with zeros -2, 1, and 5 and going through the point  $(0, -3)$ .

14) The graph of  $y = 2 - a^{x+3}$  for  $a > 1$  is best represented by which graph?



15) Describe the transformations that can be used to transform the graph of  $\log(x)$  to a graph of  $f(x) = 4\log(x+2) - 3$ .

16) The number of elk after  $t$  years in a state park is modeled by the function  $P(t) = \frac{1216}{1 + 75e^{-0.03t}}$ .

- a) What was the initial population of elk?
- b) When will the number of elk be 750?
- c) Use your calculator to determine the maximum number of elk possible in the park?

17) Arturo invests \$2700 in a savings account that pay 9% interest, compounded quarterly. If there are no other transactions, when will his balance reach \$4550?

18) Simplify  $(\csc(x) - \tan(x))\sin(x)\cos(x)$

A.  $\sin(x) - \cos^2(x)$

B.  $\cos(x) - \sin^2(x)$

C.  $\sin^2(x) + \cos(x)$

D.  $\cos^2(x) - \sin(x)$

19) Without using a calculator, find the exact value of  $\cos^{-1}\left(\cos\left(\frac{17\pi}{5}\right)\right)$ . Justify your answer.

20) Solve the inequality  $x^2 - x - 12 > 0$ .

A.  $(-\infty, -4) \cup (3, \infty)$

B.  $x = 4, x = -3$

C.  $(-3, 4)$

D.  $(-\infty, -3) \cup (4, \infty)$

21) Find the perimeter of a  $30^\circ$  slice of cheesecake if the radius of the cheesecake is 8 inches.

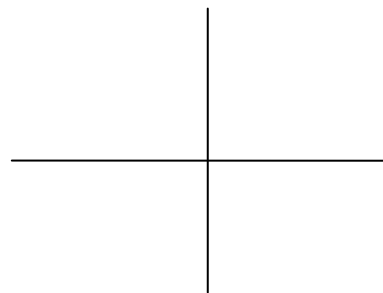
22) Use polynomial long division to rewrite the expression  $\frac{x^3 + 7x^2 + 14x - 8}{x - 4}$

23) Transform  $y = -3x^2 - 24x + 11$  to vertex form by completing the square.

- 24) Solve the system of equations graphically, accurate to the nearest thousandth. Please sketch and label your solution on the graph provided.

$$\frac{x^2}{2} + \frac{y^2}{5} = 1$$

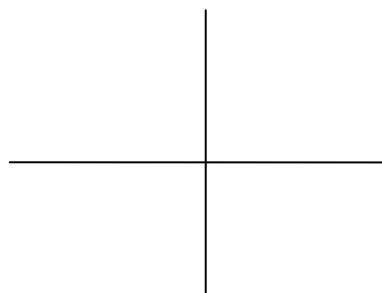
$$y = \frac{1}{3}x$$



- 25) Two students are 180 feet apart on opposite sides of a telephone pole. The angles of elevation from the students to the top of the pole are  $35^\circ$  and  $23^\circ$ . Find the height of the telephone pole.

- 26) Graph the piecewise function.

$$f(x) = \begin{cases} -x^2 & -2 \leq x < 1 \\ -2 & x = 1 \\ 3x + 5 & 1 < x \leq 3 \end{cases}$$

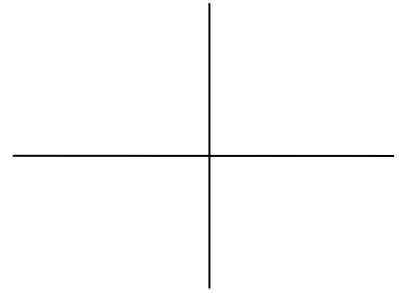


- 27) Solve the equation  $2\sin^2(x)\cos(x) = \cos(x)$  algebraically.

- 28) Find all the exact solutions to  $2\sin^2(x) + 3\sin(x) - 2 = 0$  on the interval  $[0, 2\pi)$ .

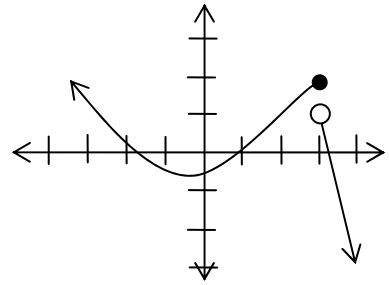
- 29) Find the points of intersection of

$$x^2 + y^2 = 4 \text{ and } x^2 + y^2 - 4x - 4y = -4$$



- 30) For the function  $f(x)$  graphed answer the following

- A.  $f(3)$                       B.  $f(x) = 0$   
C.  $f(0)$                         D.  $f(x) = 1$



- 31) Use a graphing calculator to solve the following for  $x$ .  $e^{2x} = 3x^2$

- 32) Find the domain of  $f(x) = \frac{\sqrt{x+5}}{x+2}$ . Express your answer in interval notation.

- 33) Give that  $f(x) = \frac{2x^2}{5x^2 - 9x - 2}$ . Find the vertical asymptotes. Also state the Domain of the function.

- 34) Use a graphing calculator to approximate all of the function's real zeros. Round your results to 4 decimal places.  $f(x) = 3x^6 - 5x^5 - 4x^3 + x^2 + x + 1$

35) Factor to solve the inequality. Write your answer in interval notation.  $0 \leq \frac{x^3 - 64}{x - 3}$

36) Simplify the expression as much as possible  $\frac{\frac{1}{\sqrt{3(x+h)}} - \frac{1}{3x}}{h}$

37) Simplify the expression as much as possible.  $10x^2 \cdot \frac{1}{5}(3x^2 - 4)^{-4/5} 6x + (3x^2 - 4)^{1/5} \cdot 20x$

38) Use your calculator to determine where the two lines intersect.

$$-x + 5y = 22 \text{ and } 7x - 2y = 19.$$

- 39) Simplify the expression and determine where the expression is positive.

$$\frac{2(2x+1)}{x^2+x-6} - \frac{2}{x+3} - \frac{x}{2-x}$$

- 40) Use the quadratic formula to find the exact solution to  $x^4 - 5x^2 + 3 = 0$ . Show all work.