Name_____

AP Calculus BC
Prep Assignment

This assignment is due the first day of class semester 2

Show your work in the space provided. Transfer your solutions to the answer sheet located at the end of the packet.

Calculator: A graphing calculator is a requirement for taking AP Calculus. Most students use a TI-84 Plus or a TI-86. A TI-89 is desirable but costs more. A TI-92 is not permitted.

Be able to do the following on your calculator:

- Graph a function using an appropriate window
- Use the trace key to find the value of a function at a point
- Find the zeros of a function
- Find the coordinates of the point(s) of intersection of two functions
- Use the equation solver

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1. *Simplify these expressions. Remove all negative exponents.*

a) $\dfrac{(2a^2)^3}{b}$

b) $\sqrt{9ab^3}$

c) $\dfrac{a\left(\frac{2}{b}\right)}{\frac{3}{a}}$

d) $\dfrac{ab-a}{b^2-b}$

e) $\dfrac{a^{-1}}{(b^{-1})\sqrt{a}}$

f) $\left(\dfrac{a^{\frac{2}{3}}}{b^{\frac{1}{2}}}\right)^2\left(\dfrac{b^{\frac{3}{2}}}{a^{\frac{1}{2}}}\right)$

2. *Solve this rational equation:* $2x+1=\dfrac{5}{x+2}$

3. *State the domains of these functions.*

a) $f(x)=7$ b) $g(x)=\dfrac{5x-3}{2x+1}$ c) $h(x)=\dfrac{3x+1}{\sqrt{x^2+x-2}}$

4. *Solve for the indicated varaible.*

a) $\dfrac{2x}{4\pi}+\dfrac{1-x}{2}=0$ *(solve for x)* b) $\dfrac{x}{a}+\dfrac{y}{b}+\dfrac{z}{c}=1$ *(solve for a)*

5. *Solve these inequalities. Write the answers using interval notation.*

a) $x^2 - 2x - 3 < 0$

b) $\dfrac{2x-1}{3x-2} \leq 1$

6. *Solve for x.*

a) $|5x - 2| = 8$

b) $|4 - x| \leq 1$

7. a) Find the point of intersection of the lines $3x - y - 7 = 0$ and $x + 5y + 3 = 0$.

b) On the answer sheet, shade the region in the xy-plane that is described by these inequalities:

$3x - y - 7 < 0$ and $x + 5y + 3 \geq 0$.

8. The equation $12x^3 - 23x^2 - 3x + 2 = 0$ has a solution of $x = 2$. Find all other solutions.

9. *Find the inverses of these functions. Solve for y.*

a) $y = 2x + 3$

b) $y = \dfrac{x+2}{5x-1}$

10. If $f(x) = x^2 - 2$ and $g(x) = \sqrt{x+1}$, find a) $f(g(x))$ and b) $g \circ f$.

11. For the following rational functions, determine the x- and y-intercepts and all asymptotes. Sketch the graphs on the answer sheet.

a) $f(x) = \dfrac{3}{x^2 - x - 2}$ b) $g(x) = \dfrac{4x^2 - 7x - 2}{x^2 - 1}$

12. Determine the equations of the following lines:

a) the line through $(-1, 3)$ and $(2, -4)$.

b) the line through $(2, 3)$ and the midpoint of the segment from $(-1, 4)$ to $(3, 2)$.

13. Find the equation of the circle with center $(1, -2)$ and passing through $(-3, 1)$.

14. Complete the square to write the equations of the parabolas in standard form.

a) $y = x^2 + 4x + 3$ b) $9y^2 - x - 6y - 9 = 0$

15. *Without using your calculator, sketch the graphs of these functions on the answer sheet.*

a) $f(x) = \sqrt{x+3}$

b) $g(x) = 2 - x^2$

c) $h(x) = \dfrac{1}{x-2}$

d) $F(x) = 3^{x-1} + 4$

e) $G(x) = 5 \cdot \log_2 x$

f) $H(x) = [x]$

16. *Use properties of logs to simplify these expressions.*

a) $\log 5 + \log\left(x^2 - 1\right) - \log\left(x - 1\right)$

b) $2\log\sqrt{x} + 3\log x^{\frac{1}{3}}$

c) $\log\left(10^{\frac{1}{2}}\right)$

d) $\log\left(\dfrac{1}{10^x}\right)$

e) $3^{2\log_3 5}$

17. *Solve for x. Do not use a calculator.*

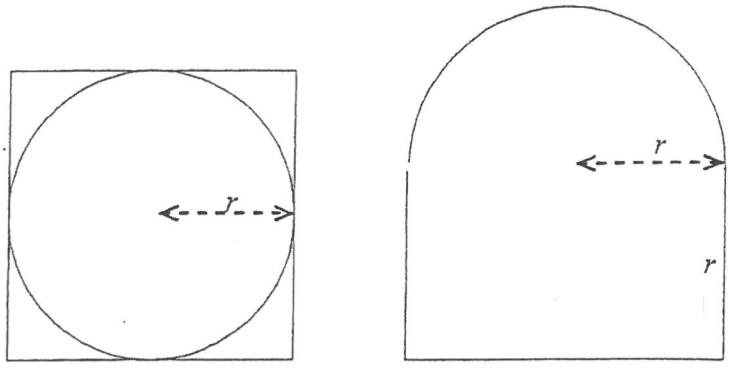
a) $5^{(x+1)} = 25$

b) $\log_2 x = 3$

c) $\frac{1}{3} = 3^{2x+2}$

18. A water tank has the shape of a cone. The tank is 10 meters high and has a diameter of 6 meters at the top. If the water is 5 meters deep (in the center of the cone), what is the surface area of the water?

19.

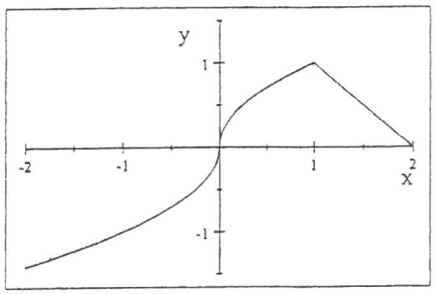


(a) (b)

a) In terms of r, find the ratio of the area inside the square but outside the circle to the area of the square in picture (a) below.

b) In terms of r, find a formula for the perimeter of the window in picture (b) above.

20. The graph of the function $f(x)$ is given here:



On your answer sheet, sketch the graphs of the following functions:

a) $f(x+1)$ b) $f(-x)$ c) $|f(x)|$ d) $f(|x|)$

21. Without using a calculator, evaluate the following. Use radians for the angles.

a) $\cos 120^\circ$ b) $\sin \frac{5\pi}{6}$ c) $\tan \frac{7\pi}{6}$ d) $\cos \frac{9\pi}{4}$

e) $\sin^{-1} \frac{\sqrt{3}}{2}$ f) $\tan^{-1} 1$ g) $\sin^{-1}(-1)$ h) $\cos^{-1}(-1)$

22. Solve for x where $0 \leq x < 2\pi$.

a) $\cos x \cdot \tan x - \cos x = 0$

b) $3\sin^2 x = \cos^2 x$

c) $\tan x + \sec x = 2 \cdot \cos x$

23. Without using a calculator, sketch the graphs of these functions:

a) $\sin\left(x - \frac{\pi}{4}\right)$ b) $3\sin x$ c) $\cos\frac{x}{2}$ d) $\tan x + 4$

24. Complete each identity:

a) $\sin^2 x + \cos^2 x =$

b) $\sin 2\theta =$

c) $\cos 2\theta =$

25. Write as a single equation in terms of x and y.

a) $x = t + 1$
$y = t^2 - t$

b) $x = \sin t$
$y = \cos t$

AB CALCULUS STUDENTS SHOULD STOP HERE.

26. Find $\lim_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$ for:

a) $f(x) = 2x + 3$

b) $f(x) = \dfrac{1}{x+1}$

c) $f(x) = x^2$

27. If $\lim_{x \to 1} f(x) = 5$...

a) must $f(x)$ be defined at $x = 1$?

b) If $f(x)$ is defined at $x = 1$, must $f(1) = 5$?

c) Can we conclude anything about the value of f at $x = 1$? Explain.

28. Evaluate:

a) $\lim_{x \to 1} \dfrac{x^4 - 1}{x^2 - 1}$

b) $\lim_{x \to 1} \dfrac{x - 1}{\sqrt{x+3} - 2}$

29. Find the slope of $f(x) = x^2$ at the point $(3, 9)$. Write an equation for the line tangent to the graph at that point.

30. If $f(x) = \dfrac{1}{x}$ and $\lim\limits_{x \to \frac{1}{2}} f(x) = 2$, find δ for $\epsilon = \frac{1}{4}$.

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1. a) _____ b) _____ c) _____ d) _____ e) _____ f) _____

2. _____

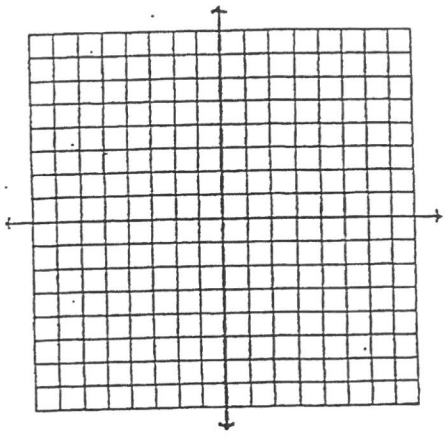
3. a) _____ b) _____ c) _____

4. a) _____ b) _____

5. a) _____ b) _____

6. a) _____ b) _____

7. a) _____ b)



8. _____

9. a) _____ b) _____

10. a) _____ b) _____

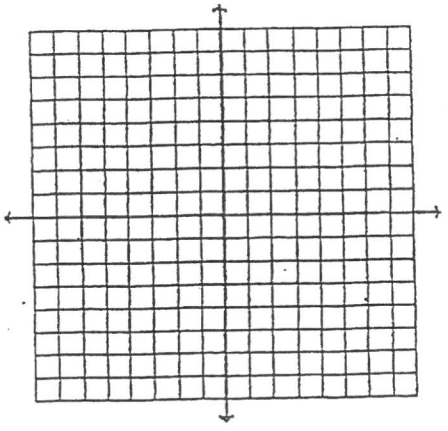
11. a) *x*-intercept(s): _____

y-intercept: _____

Vertical Asymptote(s): _____

Horizontal Asymptote: _____

Graph:



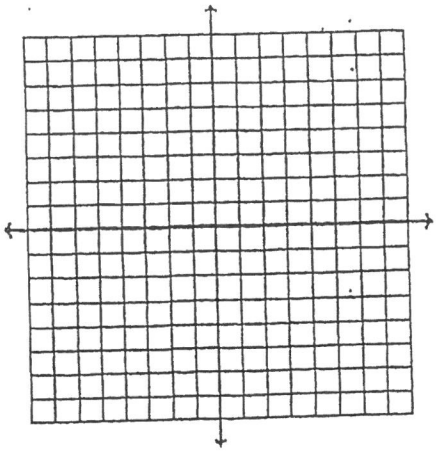
11. b) x-intercept(s): _____

y-intercept: _____

Vertical Asymptote(s): _____

Horizontal Asymptote: _____

Graph:

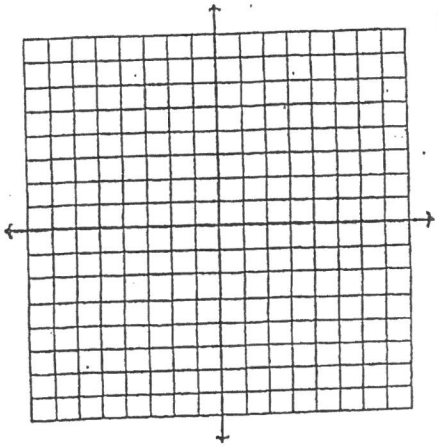


12. a) _____ b) _____

13. _____

14. a) _____ b) _____

15. a)



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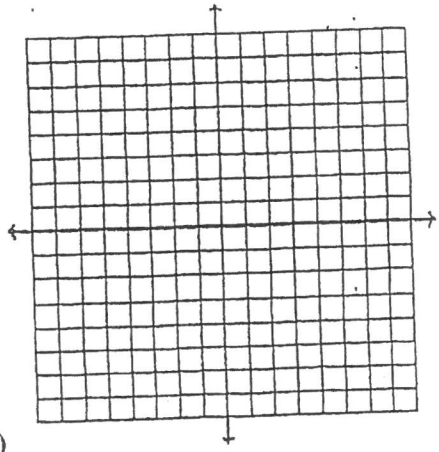

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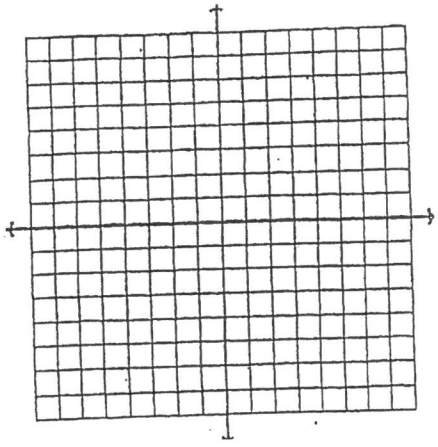
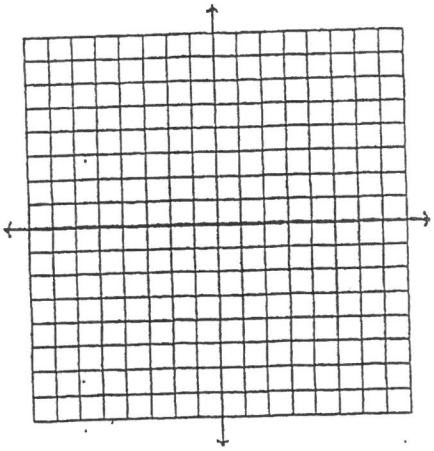
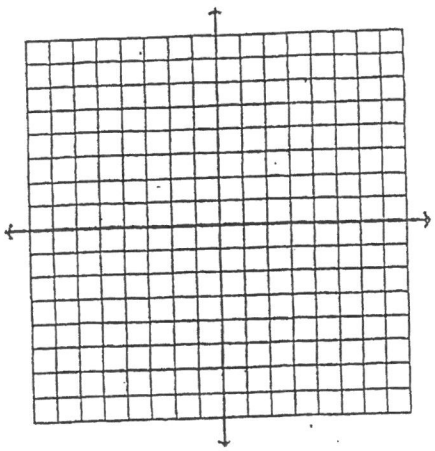


d)



e)



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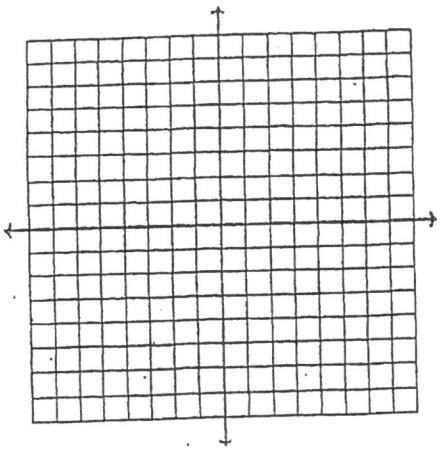


16. a) _____ b) _____ c) _____

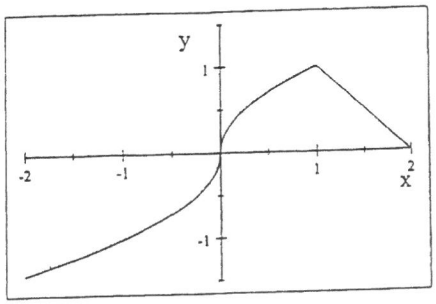
d) _____ e) _____

17. a) _____ b) _____ c) _____

18. _____

19. a) _____ b) _____

20. a)



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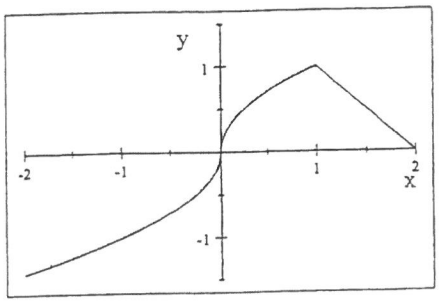

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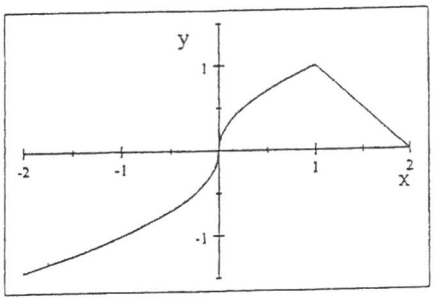

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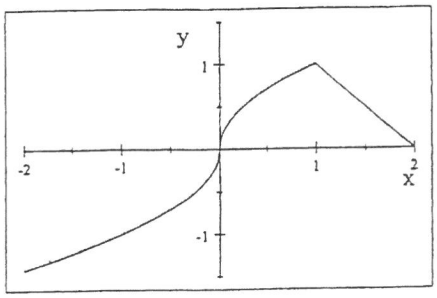
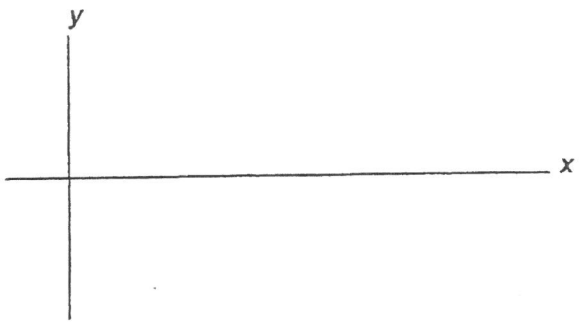


21. a) _____ b) _____ c) _____ d) _____

e) _____ f) _____ g) _____ h) _____

22. a) _____ b) _____ c) _____

23. a)



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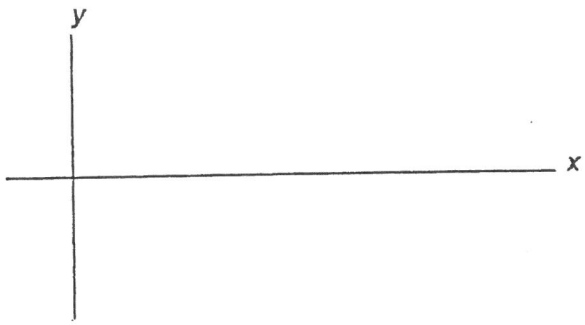

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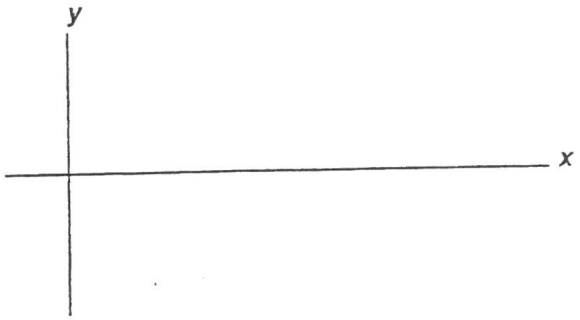

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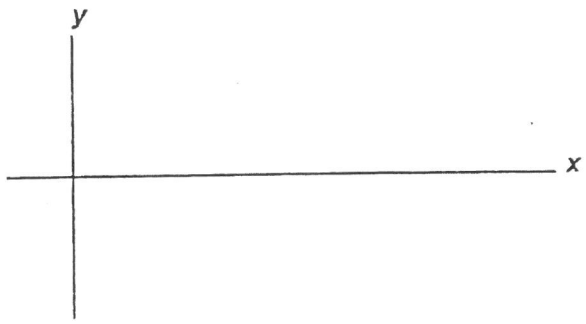

24. a) _____ b) _____ c) _____

25. a) _____ b) _____

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26. a) _____ b) _____ c) _____

27. a) _____ b) _____ c) _____

_____

28. a) _____ b) _____

29. _____

30. _____