Math 1A Practice Exam

Actual final questions will be questions of this type and questions similar to the prior exams and group work.

A cannonball is shot straight up with an initial velocity of 100 meters per second. The height in meters at time t seconds after launch is given by the equation: $s(t) = 100t - 5t^2$

1. Find the height of the cannonball at t=2.01 seconds, t=2 seconds and t=1.99 seconds.

t	s(t)

2. Use this information to estimate the velocity of the cannonball at t=2seconds.

3. Sketch a single function that meets the following criteria:

$f(2) = 0$

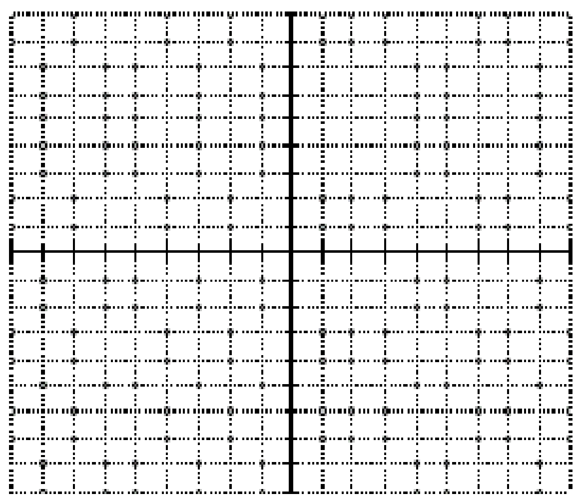
$\lim_{x \to 2} f(x) = 1$

$\lim_{x \to \infty} f(x) = 4$

$\lim_{x \to -\infty} f(x) = -4$

$\lim_{x \to -1^+} f(x) = \infty$

$\lim_{x \to -1^-} f(x) = -\infty$



Evaluate the following limits algebraically:

4. $\lim_{x \to 2^-} f(x) \quad f(x) = \begin{cases} x^2 - 1 & if \ x > 2 \\ 3x - 4 & if \ x \le 2 \end{cases}$

5. $\lim_{x \to 2^-} \frac{|x-2|}{x-2}$

6. Evaluate $\lim_{x \to 0} x^2 \sin\left(\frac{1}{x}\right)$ using the Squeeze Theorem.

A bicycle starts from rest and its distance traveled is recorded in the following table in one second intervals:

t (secs)	0	1	2	3	4	5	6	7	8
d (feet)	0	10	24	42	63	85	100	100	100

7. Compute the average speed of the bike between 1 and 2 seconds and between 2 and 3 seconds. Use this information to estimate the instantaneous speed at 2 seconds.

8. At what time shown on the table does the bike seem to be moving the fastest?

9. Determine the instantaneous speed at 7 seconds. What has happened to the bicycle?

. Consider the following function.

x	0.3	0.35	0.4	0.45	0.5
$f(x)$	1.67	1.69	1.78	1.99	2.67

10. Estimate $f'(.45)$

11. During the interval shown in the table ($0.3 \le x \le 0.5$), is $f'(x)$ positive, negative, or both? Explain how you can tell.

Let $f(x) = \sqrt[4]{x}$

12. Determine $f'(1)$

13. Use linear approximation to estimate $\sqrt[4]{1.1}$

Find the derivative of each of the following:

15. $3\sin x + 4e^x$	**16.** $x \tan x$	**17.** $\dfrac{3x^2}{5x^2 + 7x}$

Evaluate the functions using the information in the following table:

x	1	2	3	4
$f(x)$	4	1	3	2
$g(x)$	3	2	1	4
$f'(x)$	1	2	3	4
$g'(x)$	2	1	4	3

18. $h'(3)\ if\ h(x) = f(x)g(x)$

19. $m'(2)\ if\ m(x) = \dfrac{f(2)}{g(2)}$

20. $p'(1)\ if\ p(x) = \sqrt{f(x)}$

21. Find the 199th derivative of $f(x) = \sin x - 2\cos x + 3e^x$

Find $\dfrac{dy}{dx}$ for the following equations:

22. $y = \sqrt{2x - x^2}$

23. $y = e^{\sqrt{1-x^2}}$

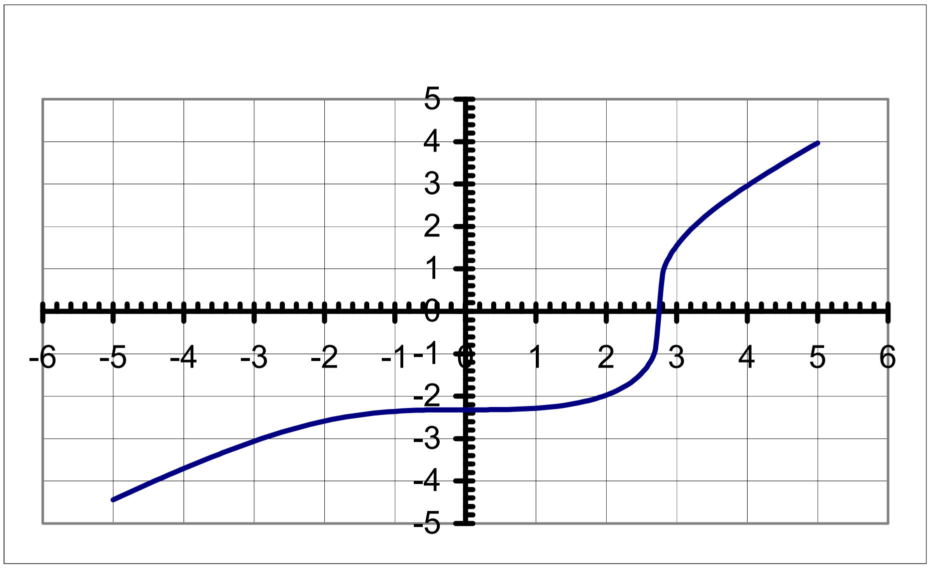
Find $\dfrac{dy}{dx}$ for the following equations:

24. $y = \sin^{-1}(x^2)$

25. $2xy = y^2$

26. $y = \ln\left[\dfrac{(x+2)^8(x+3)^6}{(2x-4)^3}\right]$	**27.** $y = (\sin x)^{2x}$

28. Consider the function of $f(x)$ shown below:



If $g(x) = f(f(x))$, find $g'(4)$ from the graph.

29. Find critical points for the following functions and determine if they are local minima or maxima: $f(x) = x\ln x$

30. Find the absolute minimum and maximum for the following functions over the given ranges:

$2x^3 + 3x^2 + 4 \quad over\ [2,-1]$

31. Steven's Creek Blvd and De Anza Blvd meet at a 90 degree intersection. Car A is on Steven's Creek Blvd and moving towards the intersection at a speed of 50 miles per hour. Car B is traveling on De Anza Blvd. towards the intersection at a speed of 40 miles per hour. When Car A is 4 miles from the intersection and Car B is 2 miles from the intersection, how fast are the cars approaching each other?

Find the exact limits algebraically

32. $\lim_{x\to 1} \frac{2^x - 2}{1 - x}$	**33.** $\lim_{x\to 0} x^{2x}$

34. A farmer wants to fence of an area in the shape of a rectangle. One side of the fence will cost $40 per linear foot while the other three sides will cost $20 per linear foot. The farmer can spend $6000 on fencing. Find the dimensions of rectangle that maximize area.

35. Necklaces cost each to $6 to make. You can sell 20 necklaces when the price is $10 per necklace. For every increase of $1, you will lose 2 sales. Find the price that will generate maximum profit.

36. You decide to use Newton's method to determine a root for $f(x) = x^4 - 20$. If your initial guess is $x_1 = 2$, find the value for x_2.

37. Find $f(x)$ when $f'(x) = 3\cos x + 5\sin x$ and $f(0) = 4$

38. Find the equation of the tangent to the parametric curve $x = e^{\sqrt{t}}$, $y = t - \ln t^9$ at the point (x,y) when t=1.