

NAME: _____

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MATH 181 TEST 1 SAMPLE

NOTE: The actual exam will only have 14 questions. The different parts of each question (part A, B, etc.) are variations. Know how to do all the variations on this exam.

1A.) (5 pts) Find the equation for the tangent to the curve
 $y = x^3 - 2x^2$ at the point (2, 0). Use $\lim_{h \rightarrow 0} \frac{f(x_0 + h) - f(x_0)}{h}$.

1A. _____

1B.) (5 pts) Find the equation for the tangent to the curve
 $y = \sqrt{x-1}$ at the point (5, 2). Use $\lim_{h \rightarrow 0} \frac{f(x_0 + h) - f(x_0)}{h}$.

1B. _____

1C.) (5 pts) Find the equation for the tangent to the curve

$$y = \frac{4}{x-1} \text{ at the point } (5, 1). \text{ Use } \lim_{h \rightarrow 0} \frac{f(x_0 + h) - f(x_0)}{h}.$$

1C. _____

2A.) (4 pts) Find the limit: $\lim_{x \rightarrow 0} \left(\frac{\sin^2 x}{1 - \cos x} \right)$

2A. _____

Tangent and Cotangent Identities

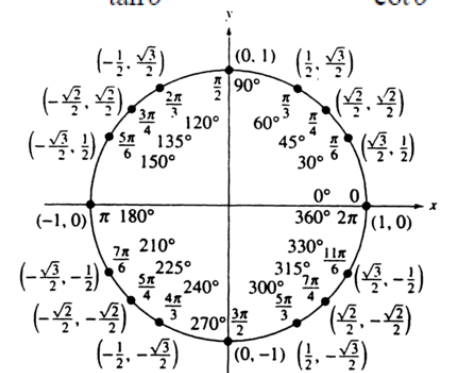
$$\tan \theta = \frac{\sin \theta}{\cos \theta} \qquad \cot \theta = \frac{\cos \theta}{\sin \theta}$$

Reciprocal Identities

$$\csc \theta = \frac{1}{\sin \theta} \qquad \sin \theta = \frac{1}{\csc \theta}$$

$$\sec \theta = \frac{1}{\cos \theta} \qquad \cos \theta = \frac{1}{\sec \theta}$$

$$\cot \theta = \frac{1}{\tan \theta} \qquad \tan \theta = \frac{1}{\cot \theta}$$



2B.) (4 pts) Find the limit: $\lim_{x \rightarrow \frac{\pi}{2}} \left(\frac{\cos x}{\cot x} \right)$

2B. _____

3A.) (4 pts) Find the exact value: $\lim_{x \rightarrow \frac{5}{2}} \left(\frac{2x^2 - 3x - 5}{2x^2 - 7x + 5} \right)$

3A. _____

3B.) (4 pts) Find the exact value: $\lim_{x \rightarrow \frac{3}{2}} \left(\frac{3 - 2x}{4x^2 - 9} \right)$

3B. _____

4A.) (4 pts) Find the exact value: $\lim_{h \rightarrow -2} \left(\frac{h+2}{\sqrt{h^2+5}-3} \right)$

4A. _____

4B.) (4 pts) Find the exact value: $\lim_{h \rightarrow 0} \left(\frac{\sqrt{5+h}-\sqrt{5}}{h} \right)$

4B. _____

5A.) (6 pts) Find $\lim_{x \rightarrow -3} (3-4x)$. Then use the $\varepsilon - \delta$ definition of a limit to prove your answer. Please show all steps for full credit.

5B.) (6 pts) Find $\lim_{x \rightarrow 2} \left(\frac{3x}{2} - 5 \right)$. Then use the $\varepsilon - \delta$ definition of a limit to prove your answer. Please show all steps for full credit.

6A.) (4 pts) Use the following information to answer the questions:

$$f(x) = \sqrt{x-3}, L = 2, x_0 = 7, \varepsilon = 1$$

i.) Find an open interval about x_0 on which the inequality $|f(x) - L| < \varepsilon$ holds.

6i. _____

ii.) Give a value for $\delta > 0$ such that for all x satisfying $0 < |x - x_0| < \delta$ the inequality $|f(x) - L| < \varepsilon$ holds:

6ii. _____

6B.) (4 pts) Use the following information to answer the questions:

$$f(x) = \frac{x}{4}, L = 2, x_0 = 8, \varepsilon = 0.01$$

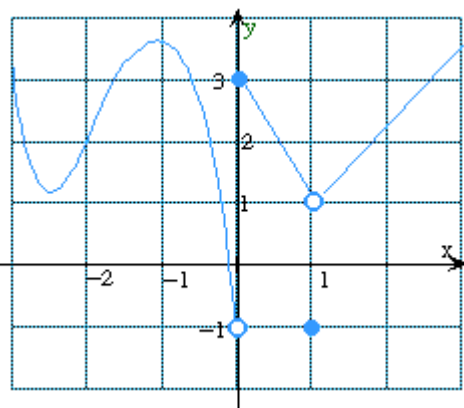
i.) Find an open interval about x_0 on which the inequality $|f(x) - L| < \varepsilon$ holds.

6i. _____

ii.) Give a value for $\delta > 0$ such that for all x satisfying $0 < |x - x_0| < \delta$ the inequality $|f(x) - L| < \varepsilon$ holds:

6ii. _____

7A.) (5 pts.) Find the following by using the graph of $f(x)$ below. If it doesn't exist, write d.n.e.



$$f(1): \underline{\hspace{2cm}} \quad f(0): \underline{\hspace{2cm}}$$

$$\lim_{x \rightarrow 0^-} f(x): \underline{\hspace{2cm}} \quad \lim_{x \rightarrow 0^+} f(x): \underline{\hspace{2cm}}$$

$$\lim_{x \rightarrow 0} f(x): \underline{\hspace{2cm}} \quad \lim_{x \rightarrow 1^-} f(x): \underline{\hspace{2cm}}$$

$$\lim_{x \rightarrow 1} f(x): \underline{\hspace{2cm}} \quad \lim_{x \rightarrow 1^+} f(x): \underline{\hspace{2cm}}$$

$$\lim_{x \rightarrow -2^-} f(x): \underline{\hspace{2cm}} \quad \lim_{x \rightarrow -2} f(x): \underline{\hspace{2cm}}$$

8C.) (4 pts) Find the exact value: $\lim_{x \rightarrow 0} \frac{\sin x(1 - \cos x)}{x^2}$

8C. _____

For problem 9, on the first blank, indicate the x -values (if any) at which f is not continuous. On the second blank, indicate which discontinuity is removable (if any), and on the third blank, indicate which discontinuity is non-removable (if any). If f is continuous, just write “none” in the first blank and don’t write anything in the other 2 blanks.

9A.) (3 pts) $f(x) = 2 \tan \theta \cos \theta$ on $[0, \pi]$

9A. _____

9B.) (3 pts) $f(x) = \frac{x+5}{x^3 + x^2 - 20x}$

9B. _____

10A.) (4 pts) Find the limit (if possible): $\lim_{x \rightarrow -5^+} \frac{x-3}{x^2+2x-15}$

10A. _____

10B.) (4 pts) Find the limit (if possible): $\lim_{x \rightarrow -10^-} -\frac{2x^2+13x+15}{2x^2+23x+30}$

10B. _____

11A.) (4 pts) Find the limit (if possible): $\lim_{y \rightarrow 4^-} \frac{y+4}{y^2-10y-24}$

11A. _____

11B.) (4 pts) Find the limit (if possible): $\lim_{\theta \rightarrow 0^+} \frac{6\sin\theta-1}{\cos\theta+1}$

11B. _____

12A.) (4 pts) Find the exact value: $\lim_{\theta \rightarrow \infty} \cos\left(\frac{\sin \theta}{\theta}\right)$

12A. _____

12B.) (4 pts) Find the exact value: $\lim_{x \rightarrow \infty} \frac{x^4 - 3x^5}{7x^5 - 3x + \sin(x^5)}$

12B. _____

13A.) (4 pts) Find the following infinite limits (if possible): $\lim_{w \rightarrow \infty} \frac{\sqrt{5 + 36w^2}}{3w - 4}$

13A. _____

13B.) (4 pts) Find the following infinite limits (if possible): $\lim_{x \rightarrow -\infty} \frac{10x - 1}{\sqrt{4x + 5x^2}}$

13B. _____

14A.) (5 pts) Find $\frac{dy}{dx}$ if $y = \frac{1}{\sqrt{x-1}}$. Use $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$.

14A. _____

14B.) (5 pts) Find $\frac{dy}{dx}$ if $y = 3 - 4x^2$. Use $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$.

14B. _____

MATH 181 TEST 1 REVIEW PROBS

<u>Section</u>	<u>Problems</u>
2.1	#7 – 14
2.2	#23 – 50
2.3	#15 – 26, 37, 38
2.4	#1 – 3, 21 – 30, 33
2.5	#13 – 24
2.6	#13 – 28, 37 – 44
3.1	#5 – 18
3.2	#1 – 4, 7 – 10

The test will be closed-book, and no notes are allowed (no notecards are allowed either). The exam will consist of problems similar to the ones on the sample test and the above list of review problems, which are problems from the homework sections of the e-book. The e-book can be accessed in MyMathLab by hitting the “Chapter Contents” button on the left panel and then you can select the exact section.