

1. Solve the inequality.

$$2x^2 - 8x < 24$$

- a) $0 < x < 6$
 b) $x < 6$
 c) $-2 < x < 6$
 d) $x < -2$ or $x > 6$

2. Simplify the fraction.

$$\frac{y - \frac{y+6}{y+2}}{y - \frac{4y+15}{y+2}}$$

- a) $\frac{2}{y+5}$
 b) $\frac{y-2}{y-5}$
 c) $\frac{y+5}{4y+15}$
 d) $\frac{y^2+y+6}{y^2-2y+15}$

3. Let
- $f(x) = \frac{100x-1}{2x+1}$
- . Find its inverse
- $f^{-1}(x)$
- .

- a) $\frac{x-1}{2x+100}$
 b) $\frac{x+1}{100-2x}$
 c) $\frac{2x+1}{100x-1}$
 d) $\frac{x-100}{x+2}$

4. What is the average rate of change of the function
- $f(x) = \frac{2}{x-3}$
- on the interval
- $[0, 2]$
- ?

- a) $-\frac{4}{3}$
 b) $-\frac{16}{3}$
 c) $-\frac{8}{3}$
 d) $-\frac{2}{3}$

- 5.
- $\lim_{x \rightarrow 4^+} \frac{(2-x)^2}{x(4-x)} =$

- a) $-\frac{1}{2}$
 b) 0
 c) $-\infty$
 d) $+\infty$

6. Given that
- $\lim_{x \rightarrow 3} f(x) = 4$
- and
- $\lim_{x \rightarrow 3} g(x) = 2$
- , determine
- $\lim_{x \rightarrow 3} (3f(x) + [g(x)]^3)$
- .

- a) 14
 b) 16
 c) 20
 d) 24

- 7.
- $\lim_{x \rightarrow 2} \frac{\frac{1}{2} - \frac{1}{x}}{2 - x} =$

- a) 0
 b) $-\frac{1}{4}$
 c) $-\frac{1}{2}$
 d) 1

- 8.
- $\lim_{t \rightarrow 0} \left(\frac{3}{t^2 - t} + \frac{3}{t} \right) =$

- a) -3
 b) 0
 c) ∞
 d) -6

- 9.
- $\lim_{x \rightarrow -4^-} \frac{3x+12}{|x+4|} =$

- a) -3
 b) -1
 c) 0
 d) ∞

10. According to the Intermediate Value Theorem, in which of the following intervals must the function
- $f(x) = x^3 - 3x^2 - 2x + 3$
- have a zero?

- a) $(-1, 0)$
 b) $(2, 3)$
 c) $(1, 2)$
 d) $(0, 1)$

11. Find the values of x for which the function $f(x)$ is continuous.

$$f(x) = \begin{cases} \frac{1}{x+4} & x < -2 \\ x & -2 \leq x < 4 \\ -2x + 12 & x \geq 4 \end{cases}$$

d. $f(x) = \frac{2x^2 - 2}{x - 1}$

c. $f(x) = \frac{1}{(x - 1)^2}$

- a) $(-\infty, -2) \cup (-2, \infty)$
 b) $(-\infty, -2) \cup (-2, 4) \cup (4, \infty)$
 c) $(-\infty, -4) \cup (-4, -2) \cup (-2, \infty)$
 d) $(-\infty, -4) \cup (-4, -2) \cup (-2, 4) \cup (4, \infty)$
12. For the function f whose graph is shown, arrange the following numbers in increasing order: $0, f'(0), f'(-2), f'(2)$

- a) $f'(-2), 0, f'(0), f'(2)$
 b) $f'(2), 0, f'(0), f'(-2)$
 c) $f'(-2), 0, f'(2), f'(0)$
 d) $f'(2), f'(0), 0, f'(0)$

13. The following limit represents the derivative of some function f at some number a . Find f and a .

$$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$$

- a) $f(x) = \frac{x^2 - 1}{x - 1}$ at $a = 0$
 b) $f(x) = x - 1$ at $a = 1$
 c) $f(x) = x^2 - 1$ at $a = 0$
 d) $f(x) = x^2$ at $a = 1$

MATCHING (3 pts. each) *In each of 14-18 a condition is given. Choose a function a, b, c, d, or e below that matches the condition.*

14. $\lim_{x \rightarrow 0} f(x) = 0$
 15. $\lim_{x \rightarrow 0} f(x)$ does not exist, but $\lim_{x \rightarrow 0^+} f(x)$ does exist.
 16. The graph $y = f(x)$ has exactly one infinite discontinuity.
 17. The graph $y = f(x)$ has a removable discontinuity.
 18. $f(x)$ is continuous everywhere on the real number.

Match functions a-e with 14-18. (Bubble your answer on your scantron. There is exactly one match for each.)

- a. $f(x) = \sqrt{x}$
 b. $f(x) = \frac{x}{x^2 - 4}$
 c. $f(x) = x^2 + 2$

14. 19. (10 pts.) For the function f whose graph is given, state the value of each quantity, if it exists. If it does not write DNE. Use ∞ or $-\infty$ if that best describes a limit that does not exist.
15. 20. (10 pts.) Find $f'(a)$ using the definition of the derivative, where $f(x) = \sqrt{1-2x}$. No points will be given for finding the derivative by any other means.

a) $\lim_{x \rightarrow -1^-} f(x) = \underline{\hspace{2cm}}$

b) $\lim_{x \rightarrow -1} f(x) = \underline{\hspace{2cm}}$

c) $\lim_{x \rightarrow 2} f(x) = \underline{\hspace{2cm}}$

d) $f(2) = \underline{\hspace{2cm}}$

e) $\lim_{x \rightarrow 4} f(x) = \underline{\hspace{2cm}}$

Math 140A
Exam 1
Fall 2007

Form A

1. c
2. b
3. b
4. d
5. c
6. c
7. b
8. a
9. a
10. d
11. c
12. b
13. d
14. b
15. a
16. e
17. d
18. c

19. a) 2, b) dne, c) 3, d) 2, e) $-\infty$

20. By definition of derivative at a point... $\frac{-1}{\sqrt{1-2a}}$