PRINTABLE VERSION

Practice Test 2

Question 1

Evaluate the limit: $\lim_{x \to 0}\left(\dfrac{6\,x^2 - 4\,x}{x}\right)$.

a) does not exist

b) -2

c) 0

d) -4

e) 2

Question 2

Evaluate the limit: $\lim_{x \to 1}\left(\dfrac{x^3 - 1}{x - 1}\right)$.

a) -3

b) 3

c) $\dfrac{1}{3}$

d) 0

e) does not exist

Question 3

Evaluate the limit: $\lim_{x \to 2} \frac{|x|}{x}$.

a) does not exist

b) -1

c) 1

d) 2

e) 0

Question 4

$$\lim_{x \to 100} \frac{x - 100}{\sqrt{x} - 10} =$$

a) does not exist

b) $\frac{1}{20}$

c) 10

d) 20

e) $\frac{1}{10}$

Question 5

Given that $f(x) = x^2 - 4x$. Evaluate the limit: $\lim_{x \to 4} \frac{f(x) - f(4)}{x - 4}$

a) 3

b) does not exist

c) 6

d) 4

e) 5

Question 6

Classify the discontinuities (if any) for the given function

$$f(x) = \begin{cases} 4 & x \le 0 \\ x^2 & 0 < x < 1 \\ 1 & 1 \le x < 3 \\ x & x \ge 3 \end{cases}$$

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a) The function is continuous for all x

b) The function has a removable discontinuity at $x = 1$

c) The function has a jump discontinuity at $x = 0$ and 3

d) The function has a removable discontinuity at $x = 3$

e) The function has an infinite discontinuity at $x = 3$

Question 7

The function $f(x) = \dfrac{x^2 + 3\,x + 2}{x + 1}$ is defined everywhere except at $x = -1$.
If possible, define $f(x)$ at -1 so that it becomes continuous at -1.

a) $f(-1) = 0$

b) $f(-1) = 2$

c) Not possible because there is an infinite discontinuity at the given point.

d) Not possible because there is a jump discontinuity at the given point.

e) $f(-1) = 1$

Question 8

Give the values of A and B for the function $f(x)$ to be continuous at both $x = 1$ and $x = 3$.

$$f(x) = \begin{cases} Ax - B & x \le 1 \\ 6x & 1 < x < 3 \\ Bx^2 - A & x \ge 3 \end{cases}$$

a) $A = 9$ and $B = 2$

b) $A = 9$ and $B = 3$

c) $A = 9$ and $B = 4$

d) $A = 8$ and $B = 3$

e) $A = 10$ and $B = 3$

Question 9

Given that $f(x) = \dfrac{\sqrt{x+6}-5}{x-19}$, define the function $f(x)$ at 19 so that it becomes continuous at 19.

a) $f(19) = \dfrac{1}{10}$

b) Not possible because there is an infinite discontinuity at the given point.

c) $f(19) = 10$

d) $f(19) = 6$

e) $f(19) = 0$

Question 10

Can the intermediate-value theorem be used to show there is a solution for the equation $f(x) = 0$ on the interval $[1, 2]$ if $f(x) = 2x^3 - \sqrt{8\,x+1}$? Give an explanation why.

a) No. because $f(1) < 0$ and $f(2) < 0$.

b) Yes. because $f(1) > 0$ and $f(2) < 0$.

c) Yes, because $f(1) < 0$ and $f(2) > 0$.

d) No, because $f(1) > 0$ and $f(2) > 0$.

Question 11

$$\lim_{x\to 0} \frac{7\,x}{\cot(3\,x)} =$$

a) 1

b) $\frac{7}{3}$

c) 0

d) $\frac{3}{7}$

e) The limit does not exist.

Question 12

$$\lim_{x \to 0} \frac{1 - \sec^2(2x)}{(5x)^2} =$$

a) The limit does not exist.

b) 1

c) $-\frac{4}{25}$

d) $-\frac{2}{5}$

e) $\frac{4}{25}$

Question 13

$$\lim_{x \to 0} \frac{3}{x \csc(6\,x)} =$$

a) $\frac{1}{3}$

b) 18

c) The limit does not exist.

d) -18

e) 1

Question 14

$$\lim_{h \to 0} \frac{\sqrt{7+h} - \sqrt{7}}{h} =$$

a) does not exist

b) $\frac{\sqrt{7}}{7}$

c) $\frac{\sqrt{7}}{14}$

d) $2\sqrt{7}$

e) 0

Question 15

If $f(3) = -5$ and $f'(3) = -6$, find the equation of the tangent line to f at $x = 3$.

a) $y = -6\,x - 23$

b) $y = -6\,x + 13$

c) $y = -5\,x - 6$

d) $y = -5\,x + 9$

e) $y = -6\,x - 5$

Question 16

Find the derivative of $f(x) = \dfrac{7}{x^2} + 7x^3$.

a) $f'(x) = -\dfrac{14}{x^3} + 21x^2$

b) $f'(x) = 21x^2 + 14x$

c) $f'(x) = \dfrac{7}{x^3} + 21x^2$

d) $f'(x) = -\dfrac{7}{x^3} - 21x^2$

e) $f'(x) = \dfrac{14}{x^3} + 21x^2$

Question 17

Find the slope of the line that is tangent to the graph of $f(x) = x^5 + 4x^3 - x^2 + 1$ at $x = 1$.

a) 19

b) 14

c) 12

d) 16

e) 15

Question 18

Find the derivative of the function $G(x) = \dfrac{6x^3 + 5x}{x^2 + 4}$.

a) $G'(x) = \dfrac{18\,x^2 + 5}{2\,x}$

b) $G'(x) = \dfrac{6\,x^4 + 67\,x^2 + 20}{\left(x^2 + 4\right)^2}$

c) $G'(x) = -\dfrac{6\,x^4 + 67\,x^2 + 20}{\left(x^2 + 4\right)^2}$

d) $G'(x)$ does not exist.

e) $G'(x) = -\dfrac{6\,x^4 + 67\,x^2 - x + 20}{\left(x^2 + 4\right)^2}$

Question 19

Find the derivative of the function $f(x) = 4\,x^2\sin(x) - 6\,x$.

a) $f'(x) = 8\,x\sin(x) + 4\,x^2\cos(x) - 6$

b) $f'(x) = 8\,x\cos(x) - 6$

c) $f\,'(x)$ does not exist.

d) $f\,'(x) = -8\,x\sin(x) - 4\,x^2\cos(x) - 6$

e) $f\,'(x) = 8\,x\sin(x) + 4\,x^2\cos(x)$

Question 20

Calculate the derivative of the given function: $f(x) = 3\,x^2\cot(x)$

a) $f'(x) = 6\,x\csc^2(x)$

b) $f'(x) = -6\,x\csc^2(x)$

c) $f'(x) = 6\,x\csc(x)\cot(x)$

d) $f'(x) = 6\,x\csc(x) - 3\,x^2\csc(x)\cot(x)$

e) $f'(x) = 6\,x\cot(x) - 3\,x^2\csc^2(x)$

Question 21

Find $\dfrac{dy}{dx}$ given $\sin(6\,x + 3\,y) = xy$.

a) $\dfrac{dy}{dx} = \dfrac{-12\cos(6\,x + 3\,y) - 2\,y}{3\cos(6\,x + 3\,y) + x}$

b) $\dfrac{dy}{dx} = \dfrac{-6\cos(6\,x + 3\,y) + y}{3\cos(6\,x + 3\,y) - x}$

c) $\dfrac{dy}{dx} = \dfrac{-y - 6\sin(6\,x + 3\,y)}{3\sin(6\,x + 3\,y) + x}$

d) $\dfrac{dy}{dx} = \dfrac{6\,\cos(6\,x + 3\,y) - y}{3\,\cos(6\,x + 3\,y) - x}$

e) $\dfrac{dy}{dx} = \dfrac{-6\,\cos(6\,x + 3\,y) - y}{3\,\cos(6\,x + 3\,y) + x}$

Question 22

A heap of rubbish in the shape of a cube is being compacted into a smaller cube. Given that the volume decreases at a rate of 5 cubic meters per minute, find the rate of change of an edge, in meters per minute, of the cube when the volume is exactly 27 cubic meters.

a) -27

b) $\dfrac{5}{9}$

c) $-\dfrac{27}{5}$

d) $-\dfrac{5}{27}$

e) 5

Question 23

A 5-foot ladder is leaning against a vertical wall. If the bottom of the ladder is being pulled away from the wall at the rate of 2 feet per second, at what rate is the area of the triangle formed by the wall, the ground, and the ladder changing, in square feet per second, at the instant the bottom of the ladder is 3 feet from the wall?

a) $\dfrac{7}{2}$

b) $\frac{7}{8}$

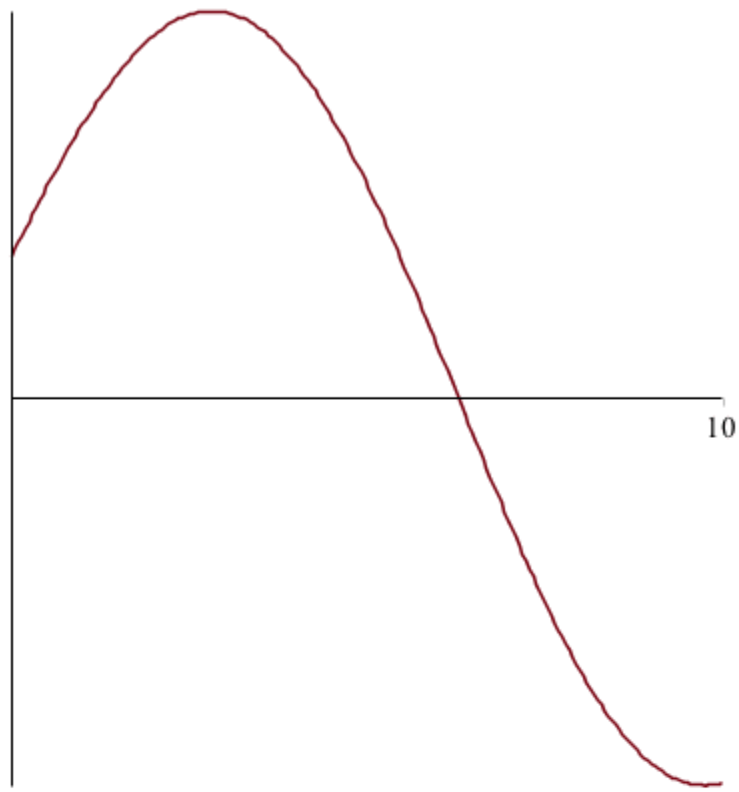
c) $-\frac{7}{4}$

d) $\frac{7}{4}$

e) $-\frac{7}{2}$

Question 24

The function *f* is graphed below on the interval [0,10].Give the **number of values***c* between 0 and 10 which satisfy the conclusion of the mean value theorem for *f*.



a) 2

b) 5

c) 4

d) 3

e) 1

Question 25

Determine if Rolles Theorem applies to the function $f(x) = x^3 - 9\,x$ on $[-3, 0]$. If so, find all numbers c on the interval that satisfy the theorem.

a) $c = \sqrt{3}$

b) $c = \sqrt{3}$ and $c = -\sqrt{3}$

c) $c = -3$

d) Rolles Theorem does not apply to this function on the given interval.

e) $c = -\sqrt{3}$