MAC2311 Practice 14

3.11: Differentials

Find the linearization L(x) of f(x) at x = a.

1) $f(x) = 2x^2 + 4x - 1, a = 4$ 1) _____

A) L(x) = 20x + 31 B) L(x) = 20x - 33 C) L(x) = 12x + 31 D) L(x) = 12x - 33

2) $f(x) = \frac{1}{9x - 5}, a = 0$ 2) _____

A) $L(x) = -\frac{9}{25}x + \frac{1}{25}$ B) $L(x) = \frac{9}{25}x + \frac{1}{25}$

C) $L(x) = \frac{9}{25}x - \frac{1}{5}$ D) $L(x) = -\frac{9}{25}x - \frac{1}{5}$

Find dy.

3) $y = \sin(5x^2)$ 3) _____

A) $-10x \cos(5x^2)\, dx$ B) $-10 \cos(5x^2)\, dx$

C) $10x \cos(5x^2)\, dx$ D) $10 \cos(5x^2)\, dx$

4) $y = 5\sqrt{x} + \frac{1}{x}$ 4) _____

A) $\left(\frac{5\sqrt{x}}{2} + \frac{1}{x^2}\right) dx$ B) $\left(\frac{5\sqrt{x}}{2} - \frac{1}{x^2}\right) dx$ C) $\left(\frac{5}{2\sqrt{x}} + \frac{1}{x^2}\right) dx$ D) $\left(\frac{5}{2\sqrt{x}} - \frac{1}{x^2}\right) dx$

Write a differential formula that estimates the given change in volume or surface area.

5) The change in the surface area $S = 4\pi r^2$ of a sphere when the radius changes from r_0 to $r_0 + dx$ 5) _____

A) $dS = 2\pi r_0\, dr$ B) $dS = 4\pi r_0^2\, dr$ C) $dS = 8\pi r_0\, dr$ D) $dS = 4\pi r_0\, dr$

Solve the problem.

6) The concentration of a certain drug in the bloodstream x hr after being administered is approximately $C(x) = \frac{3x}{9 + x^2}$. Use the differential to approximate the change in concentration as x changes from 1 to 1.43. 6) _____

A) 0.16 B) 0.19 C) 0.36 D) 0.10

7) $A = \pi r^2$, where r is the radius, in centimeters. By approximately how much does the area of a circle decrease when the radius is decreased from 4.0 cm to 3.8 cm? (Use 3.14 for π.) 7) _____

A) 5.2 cm^2 B) 5.0 cm^2 C) 2.5 cm^2 D) 4.8 cm^2

8) $V = \frac{4}{3}\pi r^3$, where r is the radius, in centimeters. By approximately how much does the volume of a sphere increase when the radius is increased from 1.0 cm to 1.2 cm? (Use 3.14 for π.) 8) _____

A) 2.7 cm^3 B) 2.5 cm^3 C) 2.3 cm^3 D) 0.5 cm^3

Answer Key
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1) B
2) D
3) C
4) D
5) C
6) D
7) B
8) B