

MA 22100

1. Find the area of the largest rectangle that can be inscribed in a quarter circle of radius 1

- A. $\frac{1}{2}$
- B. 1
- C. 2
- D. 3
- E. 6

2. A piece of wire 10 m long is cut into two pieces. One piece is bent into a square and the other is bent into an equilateral triangle (all three sides are equal in length). How should the wire be cut for the square so that the total area enclosed is a minimum? Round the answer to the nearest hundredth.

- A. 5.35 m
- B. 4.4 m
- C. 4.35 m
- D. 0 m
- E. 3.25 m

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3. A spherical balloon is being inflated with helium at the rate of $4 \text{ ft}^3/\text{min}$. Find the rate, in ft^2/min , at which the **surface area** is increasing when the volume is $\frac{32\pi}{3} \text{ ft}^3$. Note that the surface area S for a sphere with radius r is given by $S = 4\pi r^2$.

A. 4π

B. 2

C. 4

D. 1

E. 2π

4. Gravel is being dumped from a conveyor belt at a rate of $35 \text{ ft}^3/\text{min}$ and its coarseness is such that it forms a pile in the shape of a cone whose base diameter and height are always equal. How fast is the height of the pile increasing when the pile is 15 ft high? Round the result to the nearest hundredth. The volume of a cone is $\frac{1}{3}\pi r^2 h$.

A. 0.27 ft/min

B. 1.24 ft/min

C. 0.14 ft/min

D. 0.2 ft/min

E. 0.6 ft/min

5. Use **differentials** to estimate the increase in volume of a sphere when the radius is increased from 3 to 3.1. Round your answer to 1 decimal place.

- A. 11.3
B. 11.7
C. 12.1
D. 33.9
E. 39.7

6. Compute

$$\int (3x^2 - 2x + 3) dx$$

- A. $x^3 - x^2 + C$
B. $3x^3 - x^2 + 3x + C$
 C. $x^3 - x^2 + 3x + C$
D. $\frac{1}{2}(3x^2 - 2x + 3)^2 + C$
E. $6x - 2 + C$

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7. Find the area of the region under the curve $y = x^2$ and above the x -axis between $x = -1$ and $x = 2$

- A. $\frac{11}{3}$
B. $\frac{7}{3}$
C. 3
D. 5
E. 10

8. Evaluate

$$\int_{-1}^0 \sqrt{3x+4} \, dx$$

- A. 2
B. $\frac{14}{9}$
C. $\frac{14}{3}$
D. 6
E. $\frac{7}{2}$

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9. Evaluate

$$\int_0^2 \frac{x}{\sqrt{x^2+4}} dx$$

- A. $\frac{8}{3}(2\sqrt{2}-1)$
- B. $2\sqrt{2}$
- C. $\frac{8}{3}(\sqrt{2})$
- D. $4(\sqrt{2}-1)$
- E. $2(\sqrt{2}-1)$

10. Evaluate

$$\int_4^9 \frac{x+2}{2\sqrt{x}} dx$$

- A. $\frac{25}{3}$
- B. $\frac{41}{3}$
- C. $\frac{100}{3}$
- D. $\frac{5}{3}$
- E. $\frac{1}{3}$

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11. Find the area of the region bounded by the curves $y = 3 - x^2$ and $y = -1$

- A. $\frac{8}{3}$
- B. $\frac{32}{3}$
- C. $\frac{32}{3}$
- D. $\frac{16}{3}$
- E. $\frac{4}{3}$

12. Find the area of the region bounded by the curves $y^2 = -x$ and $-x + y = 2$

- A. $\frac{5}{2}$
- B. $\frac{3}{2}$
- C. $\frac{11}{6}$
- D. $\frac{9}{2}$
- E. $\frac{29}{6}$