

1. Suppose that a square of side length s and area A is changing size with $dA/dt = 60 \text{ cm}^2$ per second at all times t .

1A. At what rate is the length of the side changing at the moment when the area is 25 cm^2 ? Include the correct units in your answer.

1B. When the side reaches 10 cm, what will the rate of change in its length be at that instant?

2. Suppose f is a polynomial. Then f is continuous on $[a, b]$ and differentiable on (a, b) for any endpoints a and b . Given a and b then, the Mean Value Theorem says there must be a c in (a, b) for which $f'(c) = \text{WHAT EXPRESSION?}$

2A. Suppose in fact that $f(x) = x^3$ and $[a, b] = [1, 3]$. Find the c that's guaranteed to exist by the MVT. Show all your work and write c to at least five places after the decimal point.

3. The graph of a function $f(x)$ is made of straight lines and semicircles is shown at the bottom of the page. Find each of the following integrals.

$$\int_2^4 f(x) dx$$

$$\int_5^6 f(x) dx$$

$$\int_4^6 f(x) dx$$

$$\int_6^8 f(x) dx$$

$$\int_8^{10} f(x) dx$$

$$\int_2^2 f(x) dx$$

$$\int_4^2 f(x) dx \text{ (look carefully at the limits!)}$$

$$\int_4^5 10f(x) dx$$

