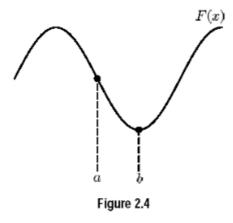
Classroom Voting Questions: Calculus I

2.2 The Derivative at a Point

- 1. We want to find how the volume of a balloon changes as it is filled with air. We know $V(r) = \frac{4}{3}\pi r^3$, where r is the radius in inches and V(r) is the volume is in cubic inches. The expression $\frac{V(3)-V(1)}{3-1}$ represents the
 - (a) Average rate of change of the radius with respect to the volume when the radius changes from 1 inch to 3 inches.
 - (b) Average rate of change of the radius with respect to the volume when the volume changes from 1 cubic inch to 3 cubic inches.
 - (c) Average rate of change of the volume with respect to the radius when the radius changes from 1 inch to 3 inches.
 - (d) Average rate of change of the volume with respect to the radius when the volume changes from 1 cubic inch to 3 cubic inches.
- 2. We want to find how the volume of a balloon changes as it is filled with air. We know $V(r) = \frac{4}{3}\pi r^3$, where r is the radius in inches and V(r) is the volume is in cubic inches. Which of the following represents the rate at which the volume is changing when the radius is 1 inch?

 - (a) $\frac{V(1.01) V(1)}{0.01} \approx 12.69$ (b) $\frac{V(0.99) V(1)}{-0.01} \approx 12.44$
 - (c) $\lim_{h\to 0} \frac{V(1+h)-V(1)}{h}$
 - (d) All of the above
- 3. Which of the following represents the slope of a line drawn between the two points marked in the figure?



(a)
$$m = \frac{F(a) + F(b)}{a+b}$$

(b)
$$m = \frac{F(b) - F(a)}{b-a}$$

(c)
$$m = \frac{a}{b}$$

(d)
$$m = \frac{F(a) - F(b)}{b-a}$$

- 4. The line tangent to the graph of f(x) = x at (0,0)
 - (a) is y = 0
 - (b) is y = x
 - (c) does not exist
 - (d) is not unique. There are infinitely many tangent lines.
- 5. Suppose that f(x) is a function with f(2) = 15 and f'(2) = 3. Estimate f(2.5).
 - (a) 10.5
 - (b) 15
 - (c) 16.5
 - (d) 18