## 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) $\lim _{h \rightarrow 0} \frac{V(1+h)-V(1)}{h}$
(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?


Figure 2.4
(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 $f^{\prime}(2)=3$. Estimate $f(2.5)$.
(a) 10.5
(b) 15
(c) 16.5
(d) 18

