Derivatives of Constants, Powers, and Sums P-Set

Find the derivative of each.

1. $f(x) = 3$

2. $f(x) = x^6$

3. $f(x) = -5x^7$

4. $f(x) = 2x^{2/3}$

5. $f(x) = 2x^3 + 4x^2 - 7x + 1$

6. $g(x) = -5x^2 - 6x + 2$

7. $h(x) = 3\sqrt{x} + \frac{1}{2}x - x^{7/3}$

The size of a certain bacteria culture at time t, in minutes, is appoximated by $N(t) = 6t^{5/2}$, where $N(t)$ is in milligrams.

8. Compute and interpret the average rate of change from $t = 1$ to $t = 4$.

9. Compute and interpret $N'(4)$

An egg is dropped from a building 150 ft tall. Its height above the ground after t seconds is given by $s(t) = 150 - 16t^2$, where $s(t)$ is measured in feet.

10. Find the a function for the velocity of the egg, using $v(t) = s'(t)$.

11. Determine and interpret $s(1)$.

12. Determine and interpret $v(1)$.

13. How many seconds (to 1 decimal place) until the egg hits the ground?

. . . .

Key

1. 0

2. $6x^5$

3. $-35x^6$

4. $\frac{4}{3}x^{-1/3}$

5. $6x^2 + 4x - 7$

6. $-10x - 6$

7. $\frac{3}{2}x^{-1/2} + \frac{1}{2} - \frac{2}{3}x^{4/3}$

8. 62; The culture size grew, on average, by 62 bacteria each minute between 1 and 4 minute.

9. $N'(4) = 120$; After 4 minutes, the culture size is growing at a rate of 120 mg/min.

10. $v(t) = -32t$

11. 132; After 1 second, the egg is 132 feet from the ground.

12. -32; After 1 second, the speed of the egg is 32 ft/s.

13. About 3.1 seconds