

Week 5 Questions and Answer Key

- Day 1, Test
- Day 2, questions 1-5
- Day 3, questions 6-10
- Day 4, questions 11-13
- Day 5, questions 14-16

1. $y = \int x^7 dx$

$$y = \frac{x^8}{8} + C$$

2. $y = \int \frac{6}{x^3} dx$

$$y = \frac{-3}{x^2} + C$$

3. $y = \int \sqrt{6x+2} dx$

$$y = \frac{(6x+2)^{\frac{3}{2}}}{\frac{3}{2}} + C$$

4. $y = \int x \sqrt[3]{5x^2-1} dx$

$$y = \frac{3(5x^2-1)^{\frac{4}{3}}}{\frac{4}{3}} + C$$

5. $y = \int (3x^2+2)(x^3+2x)^3 dx$

$$y = \frac{(x^3+2x)^4}{\frac{4}{4}} + C$$

6. $y = \int (10x-1)\sqrt{5x^2-x} dx$

$$y = \frac{2(5x^2-x)^{\frac{3}{2}}}{\frac{3}{2}} + C$$

7. $y = \int (2x+3)^2 dx$

$$y = \frac{(2x+3)^3}{\frac{3}{3}} + C$$

8. $y = 4x(x^2 + 1)^3 \, dx$

$$y = \frac{(x^2+1)^4}{2} + C$$

9. $y = \int (6x^2 + 6)(x^3 + 3x)^{-\frac{1}{3}} \, dx$

$$y = 3(x^3 + 3x)^{\frac{2}{3}} + C$$

10. $\int (x - 1)(x)^{-3} \, dx$

$$y = \frac{-1}{x} + \frac{1}{2x^2} + C$$

11. Find the equation describing the distance of an object moving along a straight line when the acceleration is $a = 3t$, when the velocity at $t = 4s$ is $40m/s$, and when the object has traveled 86m from the origin at $t = 2s$.

$$s = \frac{t^3}{2} + 16t + 50$$

12. A stone is dropped from a height of 100ft. For a free-falling object, the acceleration is $a = -32ft/s^2$ (gravity). A. Find the distance the stone has traveled after 2 seconds. Note that the initial velocity is 0 because the stone was dropped, not thrown. B. Find also the velocity of the stone when it hits the ground.

$$v = -80ft/sec$$

13. A stone is hurled straight up from the ground at a velocity of 25m/sec. A. Find the maximum height that the stone reaches. B. How long does it take for the stone to hit the ground? C. Find the speed at which the stone hits the ground.

a. $s = 31.888m$

b. $t = 5.102sec$

c. $v = -25m/sec$

14. A stone is thrown vertically upward from the roof of a 200ft tall building with an initial velocity of 30ft/sec. A. Find the equation describing the altitude of the stone from the ground. B. How long does it take for the stone to hit the ground?

a. $s = -16t^2 + 30t + 200$

b. $t = 4.594sec$

15. A stone is thrown straight down from an 80-meter-tall building with an initial velocity of 10m/sec. A. Find the equation describing the height of the stone from the ground. B. How long does it take for the stone to hit the ground?

a. $s = -4.9t^2 + 10t + 80$

b. $t = 3.147\text{sec}$

16. An object is dropped from a stationary ballon at 500m. A. Express the objects height above the ground as a function of time. B. How long does it take the object to hit the ground?

a. $s = -4.9t^2 + 500$

b. $t = 10.102\text{sec}$