



**Congratulations! You passed!**

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1. In the following quiz, you will practice how to differentiate some basic functions. Some questions look tricky, but just stick to the rules you know!

1 / 1  
points

Differentiate the function  $f(x) = x^3 + \frac{x^2}{3} + 3$ .

☒  $3x^2 + \frac{2x}{3}$

**Correct**

Well done!

☐  $3x^2 + \frac{2x}{3} + 3$

☐  $3x^2 + \frac{x^2}{3} + 3$

☐  $3x^3 + \frac{2x^2}{3}$



2. What function would differentiate to get  $f'(x) = \frac{3\pi x^4}{4} + 11x^2 + \sqrt{2}$ ?

1 / 1  
points

☐  $f(x) = \frac{3\pi x^5}{16} + \frac{11x^3}{2} + \sqrt{2}x + 2$

☒  $f(x) = \frac{3\pi x^5}{20} + \frac{11x^3}{3} + \sqrt{2}x + 2$

**Correct**

Well done! Differentiating each term would give the original expression.

☐  $f(x) = \frac{3\pi x^5}{4} + 11x^3 + \sqrt{2}x + 2$

☐  $f(x) = \frac{3\pi x^4}{20} + \frac{11x^2}{3} + \sqrt{2}x + 2$



3. When given distance as a function of time (that is, distance =  $x = x(t)$ ), one can calculate the rate of change of distance (that is, speed) as a function of time by differentiating  $x(t)$  with respect to  $t$ .

1 / 1  
points

Similarly, one can calculate the rate of change of speed (that is, acceleration) by differentiating  $x'(t)$  (the speed) with respect to  $t$ , to get the "double derivative" of  $x(t)$ .

Consider a ball being thrown from a plane in the sky. At time  $t = 0$ , has a distance from the ground of 10,000 m, has speed equal to  $0 \text{ ms}^{-1}$ , and has acceleration equal to  $-9.8 \text{ ms}^{-2}$ . Assuming that acceleration is constant, which of the following functions  $x(t)$  best describes the distance from the ground to the ball as a function of time?

☒  $x(t) = -4.9t^2 + 10,000$

**Correct**

Differentiating once gives the velocity of the ball, and differentiating once more gives the acceleration of the ball.

☐  $x(t) = 4.9t^2 + 10,000$

☐  $x(t) = -9.8t^2 + 10,000$

☐  $x(t) = -4.9t + 10,000$



4. Differentiate the function  $f(x) = x^3 + \frac{x^2}{3} + 3$  and evaluate the differential at  $x = 5$ .

1 / 1  
points

☐  $f'(5) = 85$

☒  $f'(5) = \frac{235}{3}$

**Correct**

Well done!

☐  $f'(5) = 0$

☐  $f'(5) = \frac{409}{3}$



5. Differentiate the function  $f(x) = x^3 + 27x^2 - 5x + 9$  and evaluate the differential at  $x = -1$ .

1 / 1  
points

☒  $f'(-1) = -56$

**Correct**

Well done!

☐  $f'(-1) = 40$

☐  $f'(-1) = 0$

☐  $f'(-1) = 10$