

Work through the following problems and have your tutor check your solutions and record your name before the end of your Week 12 tutorial. You are encouraged to discuss these questions and your solutions with your peers and to ask your tutor for assistance. Working through ten sets of tutorial problems is compulsory and each of the ten problem sets will contribute 0.5% towards your final grade. Note that you earn the 0.5% for your effort in solving these problems during the tutorial rather than for answering all the problems correctly.

Once you have finished these problems, you can use the remainder of your tutorial time to work on other aspects of the course. Solutions to the tutorial problems will be distributed next week.

Make sure you have finished last week's questions.

1. Find y' where $y = \sin(3x^2 + 4x)$.
2. Find $\frac{dy}{dx}$, if $y = (10x^2 + 10)^3$.
3. Let $y = -2 \ln x$. Find y' and y'' .
4. Find and classify all critical points of $f(x) = -x^3 + 3x - 7$. Sketch the function. (Previous exam question)
5. Find the equation of the tangent line to $f(x) = -x^3 + 3x - 7$ at the point $(-2, -5)$.
6. A person is fired out of a cannon so that the height, in metres, of the person is given by the function $f(t) = 42t - 5t^2 + 5$, where t is in seconds.
 - (a) Find the velocity of the person at any time t .
 - (b) How quickly is the person travelling 1.5 seconds after take-off?
 - (c) When was the person at their maximum height, and what was this height?
 - (d) Find the acceleration of the person 1.5 seconds after take-off.
7. The product of two positive numbers is 48. Find the value of the numbers if the sum of one of the numbers and the cube of the other is a minimum.