1.(1 pt) If $f(x) = 3x^2 - 3x + 6$, find $f'(-3)$. ______
Use this to find the equation of the tangent line to the parabola $y = 3x^2 - 3x + 6$ at the point $(-3, 42)$. The equation of this tangent line can be written in the form $y = mx + b$ where m is: ______
and where b is: ______

2.(1 pt) If $h(x) = 2 - 4x^3$, find $h'(2)$. ______
Use this to find the equation of the tangent line to the curve $y = 2 - 4x^3$ at the point $(2, -30)$. The equation of this tangent line can be written in the form $y = mx + b$ where m is: ______
and where b is: ______

3.(1 pt) If $f(x) = \frac{8}{x}$, find $f'(-4)$. ______
Use this to find the equation of the tangent line to the hyperbola $y = \frac{8}{x}$ at the point $(-4, -2.000)$. The equation of this tangent line can be written in the form $y = mx + b$ where m is: ______
and where b is: ______

4.(1 pt) If $f(x) = 2x + \frac{2}{x}$, find $f'(5)$.

______
Use this to find the equation of the tangent line to the curve $y = 2x + \frac{2}{x}$ at the point $(5, 10.40000)$. The equation of this tangent line can be written in the form $y = mx + b$ where m is: ______
and where b is: ______

5.(1 pt) If $f(x) = \frac{4}{x-2}$, find $f'(4)$.

______
Use this to find the equation of the tangent line to the curve $y = \frac{4}{x-2}$ at the point $(4, 2.00000)$. The equation of this tangent line can be written in the form $y = mx + b$ where m is: ______
and where b is: ______

6.(1 pt) If $f(x) = 4x + 3\sqrt{x}$, find $f'(4)$.

______
Use this to find the equation of the tangent line to the curve $y = 4x + 3\sqrt{x}$ at the point $(4, 22.00000)$. The equation of this tangent line can be written in the form $y = mx + b$ where m is:

______
and where b is: ______

7.(1 pt) If

$$f(x) = \frac{2x}{1 + x^2}$$

find $f'(4)$.

______
Use this to find the equation of the tangent line to the curve $y = \frac{2x}{1+x^2}$ at the point $(4, 0.47059)$. The equation of this tangent line can be written in the form $y = mx + b$ where m is: ______
and where b is: ______

8.(1 pt) The parabola $y = x^2 + 5$ has two tangents which pass through the point $(0, -5)$. One is tangent to the to the parabola at $(A, A^2 + 5)$ and the other at $(-A, A^2 + 5)$. Find (the positive number) A. ______

9.(1 pt)
On a separate piece of paper, sketch the graph of the parabola $y = x^2 + 7$. On the same graph, plot the point $(0, -4)$. Note that there are two tangent lines of $y = x^2 + 7$ that pass through the point $(0, -4)$.
Specifically, the tangent line of the parabola $y = x^2 + 7$ at the point $(a, a^2 + 7)$ passes through the point $(0, -4)$ where $a > 0$. The other tangent line that passes through the point $(0, -4)$ occurs at the point $(-a, a^2 + 7)$.
Find the number a. ______

10.(1 pt) The graph of $f(x) = 2x^3 + 12x^2 - 72x + 8$ has two horizontal tangents. One occurs at a negative value of x and the other at a positive value of x. What is the negative value of x where a horizontal tangent occurs? ______
What is the positive value of x where a horizontal tangent occurs? ______

11.(1 pt) For what values of x does the graph of

$$f(x) = 8x^3 - 24x^2 - 72x + 96$$

have a horizontal tangent? Enter the x values in order, smallest first, to 4 places of accuracy:
$x_1 =$ ______ $\leq x_2 =$ ______

12.(1 pt) For what values of x does the graph of

$$f(x) = 10x^3 - 25.5x^2 + 16.875x + 72$$

have a horizontal tangent? Enter the x values in order, smallest first, to 4 places of accuracy:
$x_1 =$ ______ $\leq x_2 =$ ______

13.(1 pt) For what values of x is the tangent line of the graph of

$$f(x) = 8x^3 + 24x^2 - 192x - 24$$

parallel to the line $y = 0x + 0.7$? Enter the x values in order, smallest first, to 4 places of accuracy:
$x_1 =$ ______ $\leq x_2 =$ ______

14.(1 pt) For what values of x is the tangent line of the graph of

$$f(x) = 8.6x^3 - 20.64x^2 - 15.706x - 72.24$$

parallel to the line $y = -1x - 2$? Enter the x values in order, smallest first, to 4 places of accuracy:
$x_1 =$ ______ $\leq x_2 =$ ______

15.(1 pt) Given

$$f(x) = x + \sqrt{x}$$

Calculate the tangent line at the point $(49, 56)$
$y =$ ______ $(x - 49) + 56$
For similar problems see p120:36–39.

16.(1 pt) At what point does the normal to $y = -3 + 2x + 2x^2$ at $(1, 1)$ intersect the parabola a second time?
(______ , ______)
The normal line is perpendicular to the tangent line. If two lines are perpendicular their slopes are negative reciprocals – i.e.

if the slope of the first line is m then the slope of the second line is $-1/m$

17.(1 pt) For what values of a and b is the line $-5x+y=b$ tangent to the curve $y=ax^3$ when $x=3$?

$a=$ ______ $b=$ ______

18.(1 pt) Let $f(x)=4x^2-13x+15$

The slope of the tangent line to the graph of $f(x)$ at the point $(1,6)$ is ______ .

The equation of the tangent line to the graph of $f(x)$ at $(1,6)$ is $y=mx+b$ for

$m=$ ______

and

$b=$ ______ .

Hint: the slope is given by the derivative at $x=1$, ie.

$$\lim_{x\to 1}\frac{f(1+h)-f(1)}{h}$$

19.(1 pt) Let $f(x)=10-x^2$

The slope of the tangent line to the graph of $f(x)$ at the point $(-2,6)$ is ______ .

The equation of the tangent line to the graph of $f(x)$ at $(-2,6)$ is $y=mx+b$ for

$m=$ ______

and

$b=$ ______ .

Hint: the slope is given by the derivative at $x=-2$, ie.

$$\lim_{x\to -2}\frac{f(-2+h)-f(-2)}{h}$$

20.(1 pt) Let $f(x)=\sqrt{25-x}$

The slope of the tangent line to the graph of $f(x)$ at the point $(9,4)$ is ______ .

The equation of the tangent line to the graph of $f(x)$ at $(9,4)$ is $y=mx+b$ for

$m=$ ______

and

$b=$ ______ .

Hint: the slope is given by the derivative at $x=9$, ie.

$$\lim_{x\to 9}\frac{f(9+h)-f(9)}{h}$$

21.(1 pt) Let $f(x)=\frac{16}{x}$

The slope of the tangent line to the graph of $f(x)$ at the point $(-5,-\frac{16}{5})$ is ______ .

The equation of the tangent line to the graph of $f(x)$ at $(-5,-\frac{16}{5})$ is $y=mx+b$ for

$m=$ ______

and

$b=$ ______ .

Hint: the slope is given by the derivative at $x=-5$, ie.

$$\lim_{x\to -5}\frac{f(-5+h)-f(-5)}{h}$$