

Calculus 1-4

1 a) $y = 4x$, slope = 4

b) $y = 3x - 5$, slope = 3

c) $f(x) = \frac{1}{3}x - 2$, slope = $\frac{1}{3}$

d) $f(x) = 2 - 3x$, slope = -3

e) $f(x) = \frac{1}{2}(1-x)$

$f(x) = \frac{1}{2} - \frac{1}{2}x$, slope = $-\frac{1}{2}$

f) $x + 2y = 3$

$\frac{2y}{2} = \frac{3-x}{2}$

$y = \frac{3}{2} - \frac{1}{2}x$, slope = $-\frac{1}{2}$

2. points: $(-3, 5)$ and $(4, -5)$

slope = $\frac{-5-5}{4-(-3)}$
 $= \frac{-10}{7}$

equation: $y - (-5) = \frac{-10}{7}(x - 4)$
 $7(y + 5) = (-10x + 40)$
 $7y + 35 = -10x + 40$
 $10x + 7y - 5 = 0$

standard form

3. $y = 16 + 3x$

$m = \frac{\Delta y}{\Delta x} \rightarrow 3 = \frac{\Delta y}{\Delta x}$

a) x increases by 4

$3 = \frac{\Delta y}{4}$

$12 = \Delta y$

y increases by 12

b) x decreases by 2

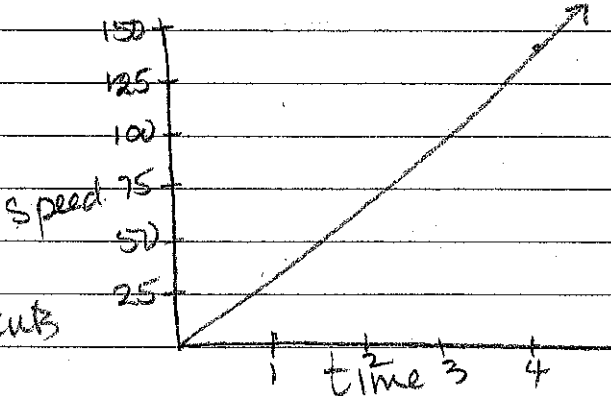
$3 = \frac{\Delta y}{-2}$

$-6 = \Delta y$

y decreases by 6

4. $s = \frac{140}{4}t$

$s = 35t$



The slope represents the speed.

1-4 cont.

5. Point P(1,3) is on $y = 2x + x^2$ ←

a) Q is $(x, 2x + x^2)$ because

i) $x=2$ then $2x + x^2 = 2(2) + 2^2 = 4 + 4 = 8$

Q(2,8) slope PQ = $\frac{8-3}{2-1} = \frac{5}{1} = 5$

ii) $x=1.5$ then $2x + x^2 = 2(1.5) + (1.5)^2 = 3 + 2.25 = 5.25$

Q(1.5, 5.25) slope PQ = $\frac{5.25-3}{1.5-1} = \frac{2.25}{0.5} = 4.5$

iii) $x=1.1$ then $2x + x^2 = 2(1.1) + (1.1)^2 = 2.2 + 1.21 = 3.41$

Q(1.1, 3.41) slope PQ = $\frac{3.41-3}{1.1-1} = \frac{0.41}{0.1} = 4.1$

iv) $x=1.01$ then $2x + x^2 = 2(1.01) + (1.01)^2 = 2.02 + 1.0201 = 3.0401$

Q(1.01, 3.0401) slope PQ = $\frac{3.0401-3}{1.01-1} = \frac{0.0401}{0.01} = 4.01$

v) $x=1.001$ then $2x + x^2 = 2(1.001) + (1.001)^2 = 2.002 + 1.002001 = 3.004001$

Q(1.001, 3.004001) slope PQ = $\frac{3.004001-3}{1.001-1} = \frac{0.004001}{0.001} = 4.001$

vi) $x=0$ then $2x + x^2 = 2(0) + 0^2 = 0$

Q(0,0) slope = $\frac{3-0}{1-0} = \frac{3}{1} = 3$

vii) $x=0.5$ then $2x + x^2 = 2(0.5) + (0.5)^2 = 1 + 0.25 = 1.25$

Q(0.5, 1.25) slope = $\frac{3-1.25}{1-0.5} = \frac{1.75}{0.5} = 3.5$

viii) $x=0.9$ then $2x + x^2 = 2(0.9) + (0.9)^2 = 1.8 + 0.81 = 2.61$

Q(0.9, 2.61) slope = $\frac{3-2.61}{1-0.9} = \frac{0.39}{0.1} = 3.9$

ix) $x=0.99$ then $2x + x^2 = 2(0.99) + (0.99)^2 = 1.98 + 0.9801 = 2.9601$

Q(0.99, 2.9601) slope = $\frac{3-2.9601}{1-0.99} = \frac{0.0399}{0.01} = 3.99$

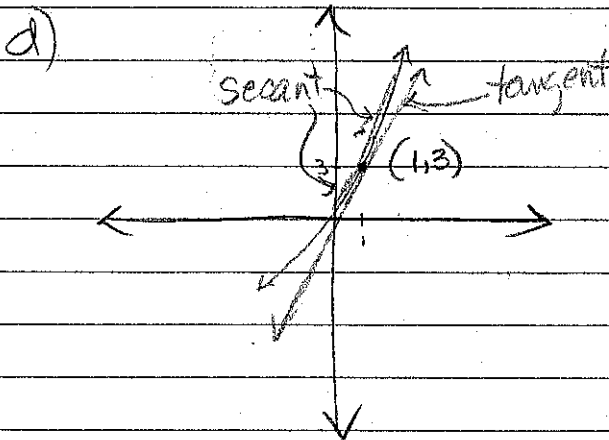
x) $x=0.999$ then $2x + x^2 = 2(0.999) + (0.999)^2 = 1.998 + 0.998001 = 2.996001$

Q(0.999, 2.996001) slope = $\frac{3-2.996001}{1-0.999} = \frac{0.003999}{0.001} = 3.999$

1-4 cont.

5. b) tangent slope = 4

$$\begin{aligned} c) \quad y - y_1 &= m(x - x_1) \\ y - 3 &= 4(x - 1) \\ y - 3 &= 4x - 4 \\ y &= 4x - 1 \end{aligned}$$



See #7 for how the work is done

6. Point $P(1, \frac{1}{4})$ is on $y = \frac{1}{4}x^3$

a)	X	$\frac{1}{4}X^3$	slope of secant	X	$\frac{1}{4}X^3$	slope of secant
	2	2	1.75	0	0	0.25
	1.5	0.84375	1.1875	0.5	0.03125	0.4375
	1.1	0.33275	0.8275	0.9	0.18225	0.6775
	1.01	0.257575	0.7575	0.99	0.24257	0.743
	1.001	0.25075	0.75	0.999	0.24925	0.75

b) slope at $P(1, \frac{1}{4})$ is probably 0.75

$$\begin{aligned} c) \quad y - y_1 &= m(x - x_1) \\ y - \frac{1}{4} &= \frac{3}{4}(x - 1) \\ y - \frac{1}{4} &= \frac{3}{4}x - \frac{3}{4} \\ y &= \frac{3}{4}x - \frac{1}{2} \\ 4y &= \frac{12}{4}x - \frac{4}{2} \\ 4y &= 3x - 2 \\ 0 &= 3x - 4y - 2 \end{aligned}$$

