1\. a) We see that f' is positive from a to c, which means f is increasing on this interval, so $\boxed{f(c) > f(a)}$.

b) f' is negative on this interval, so f is decreasing, so $\boxed{f(e) > f(g)}$.

c) We can indeed determine which is greatest. Since f' is greater than 0 for all values less than d, and less than or equal to 0 for all values greater than d, we know the function increases to d, and decreases afterward, so it must have reached a maximum at $\boxed{d.}$

d) We actually can't determine this without knowing the value of f at some value. This because functions that differ by a constant (i.e. x^2+2x & x^2+2x+5) have the same derivative, so f' doesn't tell us the value of f at a point, only how much we go up or down from one point to another.

e) e

f) f concave down means the derivative is decreasing (f' has negative slope) and f decreasing means $f' < 0$. So this gives us the intervals: $\boxed{[d, e) \text{ and } (g, h).}$ Note that the point d is the only point on the ends of these intervals which is included in them. This is because $f' = 0$ at $e, g, \& h$, and so is not < 0 at these points.

g) At $x = a$, f' has negative slope so the slope of f is decreasing $\Rightarrow$ $\boxed{\text{concave downward}}$

2.a) f is positive on $\boxed{(-\infty,-2),\ (0,2),\ \text{and}\ (4,\infty)}$

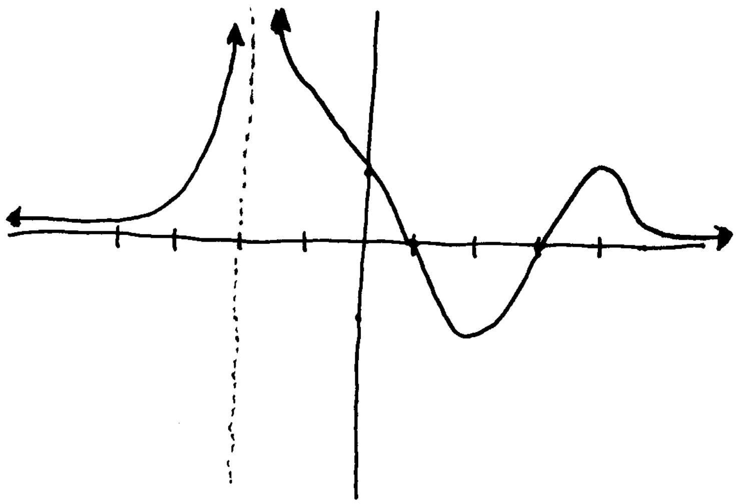
b) f' is negative on $\boxed{(1,3),}$ where the slope is negative.

c) f is decreasing where its slope (derivative) is negative
$= \boxed{(1,3).}$

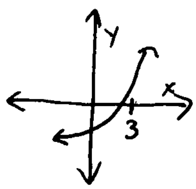
d) f' is decreasing where f is concave downward
i.e. $(-2,2)$ and $(4,\infty)$.

e) This is where $(1,3)$ intersects $(-2,2)$ and $(4,\infty)$
$= \boxed{(1,2)}$

f)



3a)



for an increasing concave up function f' should be positive (increasing), but more important here is that for an interval $(3, 3+h)$, our calculated f' should be bigger than $f'(3)$, and likewise, for $(3-h,3)$ f' should be smaller than $f'(3)$, since concave up means f' increases as x gets bigger.

Upper bound: $\dfrac{f(3+.1)-f(3)}{.1} = .94$

Lower bound: $\dfrac{f(3)-f(2.9)}{.1} = .93$

3. b) $f'(3) = \lim_{h\to 0}\left[\frac{f(3+h)-f(3)}{h}\right] = \lim_{h\to 0}\left[\frac{\frac{3^2+2\cdot 3h+h^2}{1+3+h} - \frac{3^2}{1+3}}{h}\right]$

$= \lim_{h\to 0}\left[\frac{\frac{9+6h+h^2}{4+h} - \frac{9}{4}}{h}\right] = \lim_{h\to 0}\left[\frac{\frac{4(9+6h+h^2)}{4(4+h)} - \frac{9(4+h)}{4(4+h)}}{h}\right]$

$= \lim_{h\to 0}\left[\frac{(24h+h^2-9h)}{4(4+h)\cdot h}\right] = \lim_{h\to 0}\left[\frac{15+h}{4(4+h)}\right] = \boxed{\frac{15}{16}}$

c) Superior confidence

4. a) $s(\;)-s(-2)$ hours

b) avg velocity = slope from $(2, s(2))$ to $(4, s(4))$ = $\boxed{\frac{s(4)-s(2)}{2}}$ $\frac{\text{miles}}{\text{hour}}$

c) velocity = derivative of position, so $\boxed{s'(4)}$ $\frac{\text{miles}}{\text{hour}}$

d) speed = absolute value of velocity, so $\boxed{|s'(3)|}$ $\frac{\text{miles}}{\text{hour}}$

a) $\boxed{s'(5)=-30}$ (negative because the distance is measured from the western part, so if it's going west, this distance is decreasing).

b) $s(9)=20$

5a) H hours $\cdot (1-p) = \boxed{H-Hp}$ hours

b) $W \frac{\text{dollars}}{\text{week}} \cdot \frac{1}{D} \frac{\text{weeks}}{\text{day}} \cdot \frac{1}{H} \frac{\text{days}}{\text{hour}} = \boxed{\frac{W}{DH} \frac{\text{dollars}}{\text{hour}}}$

c) $\frac{W}{DH} \frac{\text{dollars}}{\text{hour}} \cdot ? \frac{\text{hours}}{\text{page}}$

In his office, $? = \frac{1}{N} \frac{\text{hours}}{\text{page}}$, and he spends $(1-p)$ time there

At home, $? = \frac{C \text{ hours}}{B \text{ pages}}$, and he spends p fraction of his time there

So $? = \frac{1}{N}(1-p) + \frac{C}{B}(p)$

So he earns $\boxed{\frac{W}{DH}\left[\frac{1-p}{N} + \frac{Cp}{B}\right] \frac{\text{dollars}}{\text{page}}}$

1+.1 because it increases by 10%

exponent because each year it increases by 10% of the last year.

6.a) $B(t) = \begin{cases} 1000(1+.1)^t & \text{for } 0 \leq t \leq 3 \\ 1000(1.1)^3 + 60(t-3) & \text{for } t > 3 \end{cases}$

this term out front because for $t>3$ it adds 60 beavers to the population that existed at 3 years

$t-3$ because we want to earn 60 beavers per year only after year 3.

b) $B(5) = 1000(1.\ )^3 + 60(5-3) = \boxed{1451}$

c) $B'(5) = \lim_{h\to 0}\left[\frac{B(5+h - B(5)}{h}\right] = \lim_{h\to 0}\left[\frac{1000(1.1)^3 + 60(5+h-3) - 1000(1.1)^3 - 60(5-3}{h}\right.$

$= \lim_{h\to 0}\left[\frac{60(2+h) - 60(2)}{h}\right] = \boxed{60}$

7.a) $A(60) = 2030$ means that if the temperature is 60°F at the beginning of the concert, then 2030 people are expected to attend.

b) $A'(55) = -40$ means that when the temp is 55°F, it is expected that an additional drop of 1 degree will cause 40 people not to come.