***2.2 Warmup***

Determine the following:

1. $\frac{d}{dx}5$

$f(x) = 5$

$\frac{d(5)}{dx} = \frac{f(x+h)-f(x)}{h}$

$= \frac{5-5}{h} = \frac{0}{h}$

$\frac{d5}{dx} = 0$

2. $\frac{d}{dx}3x+7$ $= 3$

$\frac{f(x+h)-f(x)}{h} = \frac{[3(x+h)+7]-[3x+7]}{h}$

$= \frac{3h}{h} = 3$

3. $\frac{d}{dx}x^2$ $= \lim_{x\to a} \frac{f(x)-f(a)}{x-a}$

$= \lim_{x\to a} \frac{x^2-a^2}{x-a}$

$= \lim_{x\to a} \frac{(x+a)(x-a)}{x-a}$

$\frac{d}{dx}x^2 = 2a$

4. $\frac{d}{dx}x^3$ $= \lim_{x\to a} \frac{(x^3)-(a^3)}{x-a}$

$= \lim_{x\to a} \frac{(x-a)(x^2+ax+a^2)}{x-a}$

$= \lim_{x\to a} (x^2+ax+a^2)$

$= a^2+a^2+a^2$

$\frac{d}{dx}(x^3) = 3a^2$

5. $\frac{d}{dx}x^4$ $= \lim_{x\to a} \frac{x^4-a^4}{x-a}$

$= \lim_{x\to a} \frac{(x^2+a^2)(x^2-a^2)}{x-a}$

$= \lim_{x\to a} \frac{(x^2+a^2)(x+a)(x-a)}{x-a}$

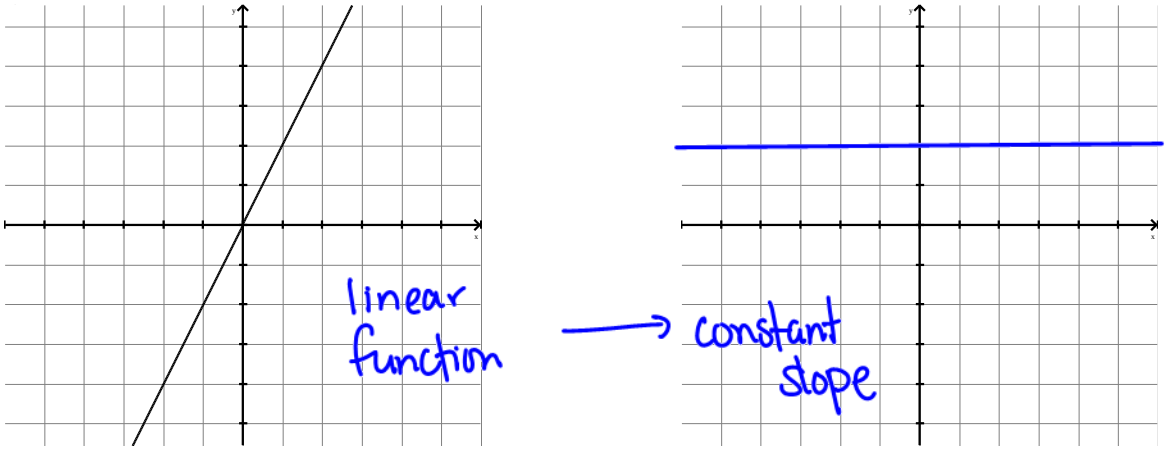
$= (a^2+a^2)(a+a) = 2a^2 \cdot 2a$

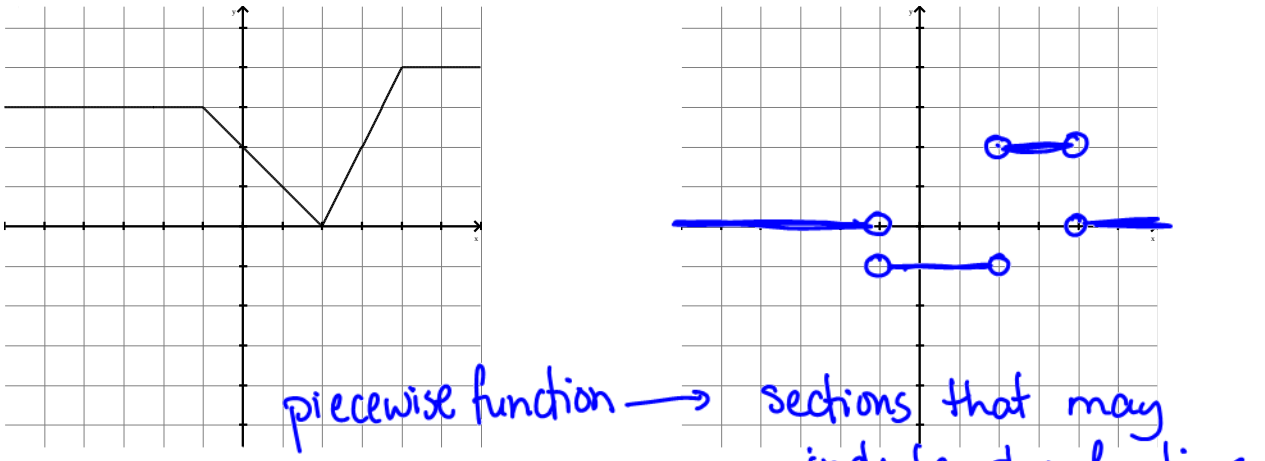
$= 4a^3$

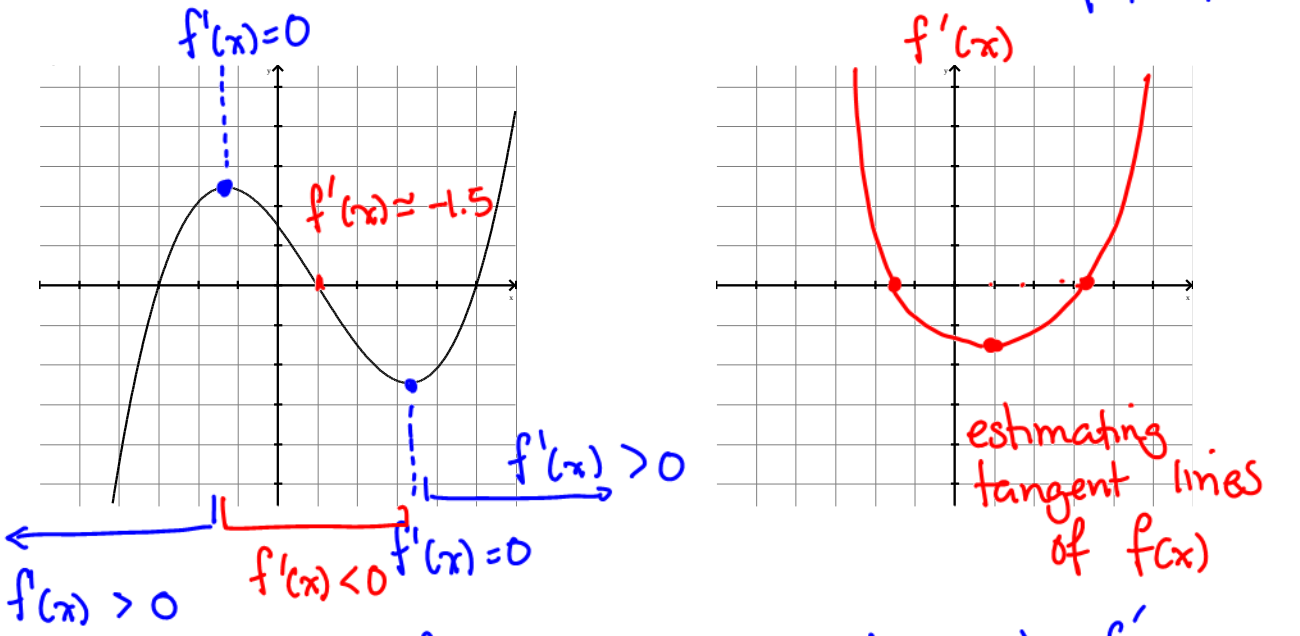
***Relationships Between the Graphs of*** $y = f(x)$ ***and*** $y = f'(x)$

***Graphing*** $f'$ ***from*** $f$ - How does the graph of the derivative compare with the graph of the original? Or what does the original function tell you about its derivative?

$y = f(x)$ $y = f'(x)$



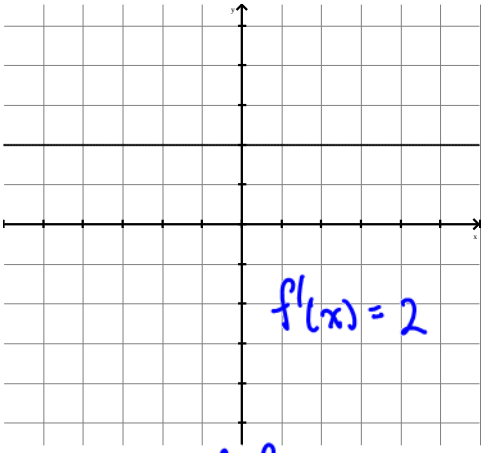




* f(x) can be used to graph f'(x)

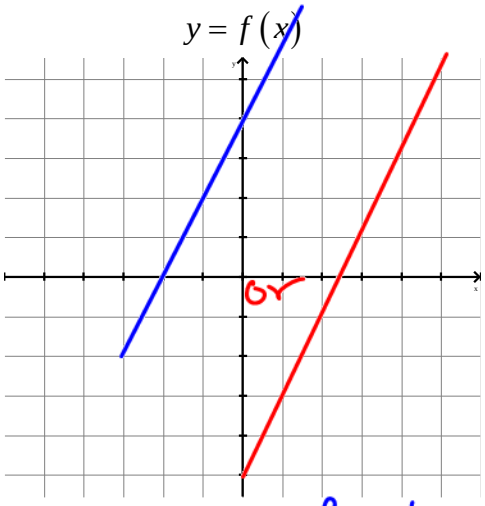
***Graphing*** $f$ ***from*** $f'$ - How does the graph of the function compare with the graph of the derivative? Or what does the derivative tell you about the original function?

$y = f'(x)$




slope of f(x) = 2

$y = f(x)$




there are many functions that have a slope of 2.

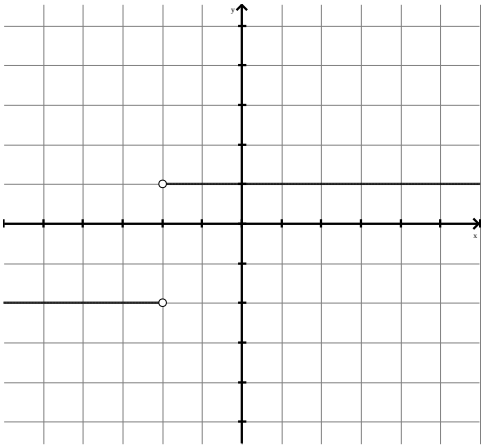
$f(x) = 2x + C$

there are many possible y-intercepts.

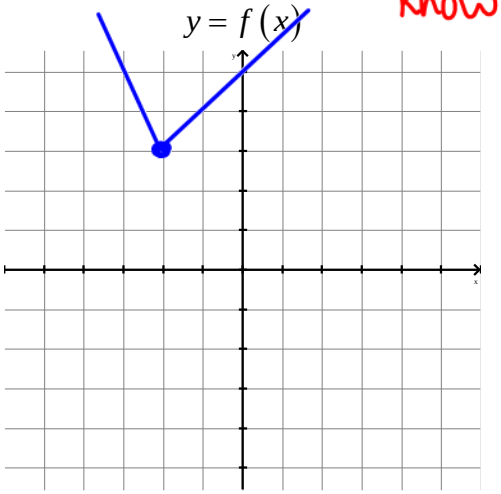
Sketch the graph of $y = f(x)$ with $f(-2) = 3$ and with the graph of $y = f'(x)$ shown below. Assume $f$ is continuous.

we can graph y=f(x) more accurately if we know a coordinate.

$y = f'(x)$



$y = f(x)$



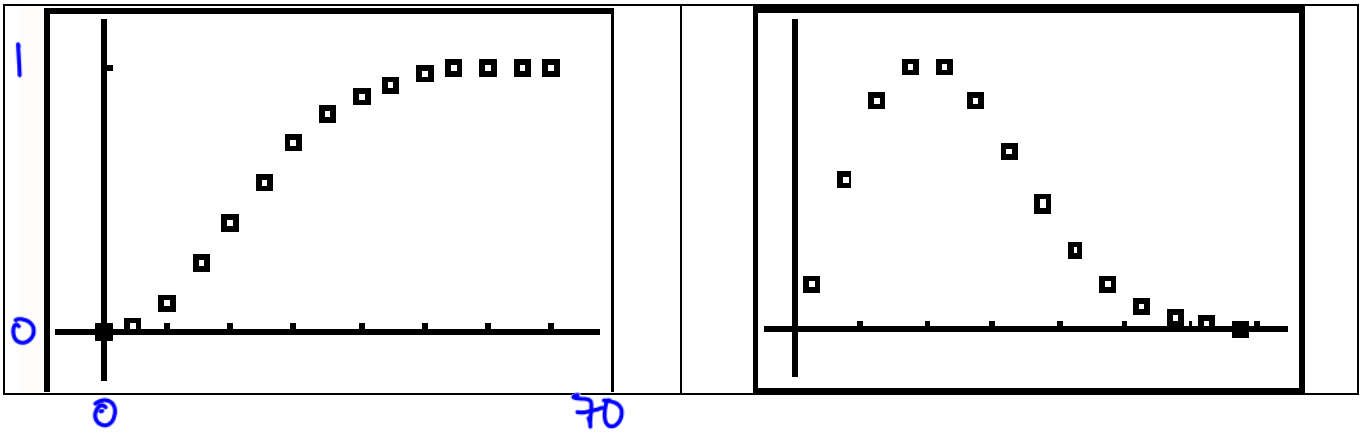
***Graphing the derivative from data*** stat > edit

Probabilities of Shared Birthdays

| # People (L1) | Probability (L2) |
|---|---|
| 0 | 0 |
| 5 | 0.027 |
| 10 | 0.117 |
| 15 | 0.253 |
| 20 | 0.411 |
| 25 | 0.569 |
| 30 | 0.706 |
| 35 | 0.814 |
| 40 | 0.891 |
| 45 | 0.941 |
| 50 | 0.970 |
| 55 | 0.986 |
| 60 | 0.994 |
| 65 | 0.998 |
| 70 | 0.999 |

Estimates of Slopes of the Probability Curve

| Midpoint of interval | Slope |
|---|---|
| 2.5 | 0.0054 |
| 7.5 | 0.0180 |
| 12.5 | 0.0272. |
| 17.5 | 0.0316 |
| 22.5 | 0.0316 |
| 27.5 | 0.0274 |
| 32.5 | 0.0216 |
| 37.5 | 0.0154 |
| 42.5 | 0.0100 |
| 47.5 | 0.0058 |
| 52.5 | 0.0032 |
| 57.5 | 0.0016 |
| 62.5 | 0.0008 |
| 67.5 | 0.0002 |




p101 #7-10
#13
#16 - 19, 21