

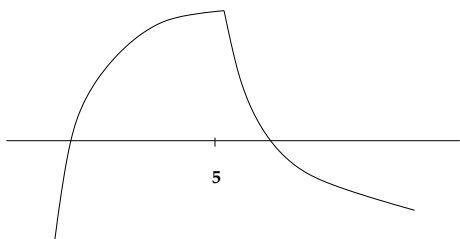
1. (a) concave up:
- $x < -2$
- and also
- $x > 2$

concave down: $-2 < x < 2$

- (b) concave up:
- $x > 0$

concave down: $x < 0$

2. for
- $x < 5$

 $f'(x)$ positive means $f(x)$ is increasing $f'(x)$ decreasing means $f(x)$ is concave down.for $x > 5$ $f'(x)$ negative means $f(x)$ is decreasing $f'(x)$ increasing means $f(x)$ is concave up.

3. (a)
- $y' = 30x^4 - 7$

(b) $y' = 3 * 5^{3x} \ln(5) - 21x^{-4}$

(c) $y' = 35x^4 + 8x^3 + 6e^{6x}$

$$y'' = 140x^3 + 24x^2 + 6 * 6e^{6x} = 140x^3 + 24x^2 + 36e^{6x}$$

4. (a)
- $y' = 8(x^5 + 3x - 5)^7 * (5x^4 + 3)$

(b) $y' = \frac{4x^3 - 35e^{5x}}{x^4 - 7e^{5x} - 9}$

(c) $y' = \frac{1}{3} (x^9 + 23x)^{-2/3} * (9x^8 + 23)$

5. (a) plug in 2 into the function to get the y-value.

point $(2, -49)$

plug in 2 into the derivative to get the slope of the tangent line.

$y' = 4x^3 - 21x^2 - 5$

$m_{tan} = -57$

Answer: $y + 49 = -57(x - 2)$

- (b) point is
- $(2, 4)$

$y' = \frac{3x^2 - 4}{x^3 - 4x + 1} + 2$

$m_{tan} = \frac{8}{1} + 2 = 10$

Answer: $y - 4 = 10(x - 2)$

6. (a)
- $H(x) = f(g(x))$
- so
-
- $H'(x) = f'(g(x)) * g'(x)$

$H'(70) = f'(g(70)) * g'(70)$

$H'(70) = f'(60) * g'(70)$

$H'(70) = 1 * 0$

Answer: $H'(70) = 0$

- (b)
- $H(x) = g(f(x))$
- so

$H'(x) = g'(f(x)) * f'(x)$

$H'(70) = g'(f(70)) * f'(70)$

$H'(70) = g'(30) * f'(70)$

$H'(70) = \frac{1}{2} * 1$

Answer: $H'(70) = \frac{1}{2}$