

Agenda: 11/3/15

HW leader (60)

Lesson 61

Playing games with f , f' and f'' ★ Explore the relationship between f , f' and f'' Ex. Given $f(x) = ax^3 + b$, that the graph of f passes through $(1, 17)$ and that $f'(2) = 48$, find a and b .

1) $f(1) = 17$ means $17 = a(1)^3 + b$ so $a + b = 17$

2) $f'(2) = 48$ means $48 = 3a(2)^2$ so $\frac{48}{12} = a$ $a = 4$

Thus $b = 17 - 4 = 13$ Thus $f(x) = 4x^3 + 13$

Ex. If $f''(x) = 8$, $f'(0) = -2$, and $f(0) = 5$, what is the equation of f ?

$$f'(x) = \int f''(x) dx = \int 8 dx = 8x + C_1 \quad f'(0) = -2$$

means $-2 = 8(0) + C_1$

Thus $f'(x) = 8x - 2$

$$f(x) = \int f'(x) dx = \int (8x - 2) dx = \frac{8x^2}{2} - 2x + C_2$$

$$5 = f(0) = C_2 \quad \text{thus}$$

$$f(x) = 4x^2 - 2x + 5$$

 $f(x)$ is a quadratic functionw/ one zero at $x = -2.3$ and whose slope at $x = 1$ is -12 . Find $f(x)$.

$$f(x) = a(x+2.3)^2 \quad f'(x) = 2a(x+2.3)$$

$$-12 = 2a(2.4) \Rightarrow a = -\frac{1}{4}$$

$$f(x) = -\frac{1}{4}(x+2.3)^2$$

If $f''(x) = \sin(x)$ and f has a zero at $x = 3$ and a horizontal tangent line at $x = \pi$, find f .

$$f'(x) = -\cos(x) - 1$$

$$f(x) = -\sin(x) - x + 3$$

$f(x)$ is a quadratic function with a local max at $x = 5$ and $f''(x) = -2$, find $f(x)$. If the graph crosses the y -axis at $y = 6$

$$0 = 2a(5) + b \Rightarrow b = -10a$$

$$-2 = 2a \Rightarrow a = -1 \quad b = 10$$

$$f(x) = -x^2 + 10x + 6$$