

January 31

What is your prediction for the super bowl?
(score, best commercial, etc.)



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Students will verbally explain how to
represent functions with Taylor
Polynomials
(using the words:
substitution, term, derivative, antiderivative..)



Construct a 4th
degree polynomial
where:

$$P(0)=1, P'(0)=2, \\ P''(0)=3, P'''(0)=4, \\ P^{(4)}(0)=5$$

$$P(x) = A + Bx + Cx^2 + Dx^3 + Ex^4$$

$$P(0) = 1 = A + B(0) + C(0)^2 + D(0)^3 + E(0)^4 \rightarrow A = 1$$

$$P'(x) = B + 2Cx + 3Dx^2 + 4Ex^3$$

$$P'(0) = 2 = B + 2C(0) + 3D(0)^2 + 4E(0)^3 \rightarrow B = 2$$

$$P''(x) = 2C + 6Dx + 12Ex^2$$

$$P''(0) = 3 = 2C + 6D(0) + 12E(0)^2 \rightarrow 3 = 2C \rightarrow C = \frac{3}{2}$$

$$P'''(x) = 6D + 24Ex$$

$$P'''(0) = 4 = 6D + 24E(0) \rightarrow 4 = 6D \rightarrow D = \frac{4}{6} = \frac{2}{3}$$

$$P^{(4)}(x) = 24E$$

$$P^{(4)}(0) = 5 = 24E \rightarrow E = \frac{5}{24}$$

$$P(x) = 1 + 2x + \frac{3}{2}x^2 + \frac{2}{3}x^3 + \frac{5}{24}x^4$$

$$P(0)=1$$

$$P'(0)=2$$

$$P''(0)=3$$

$$P'''(0)=4$$

$$P^{(4)}(0)=5$$

$$P(x) = 1 + 2x + \frac{3}{2}x^2 + \frac{2}{3}x^3 + \frac{5}{24}x^4$$

$$P(x) = \frac{1}{1} + \frac{2}{1}x + \frac{3}{2}x^2 + \frac{4}{6}x^3 + \frac{5}{24}x^4$$

$$\begin{array}{ccccc} \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ 0! & 1! & 2! & 3! & 4! \end{array}$$

Taylor Series centered at zero

$$f(x) = f(0) + f'(0)x + \frac{f''(0)x^2}{2!} + \frac{f'''(0)x^3}{3!} + \dots$$

$$= \sum_{n=0}^{\infty} \frac{f^{(n)}(0)x^n}{n!}$$