

Taylor Polynomial Example

MATH 131: Calculus II, Section 2

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Consider the function $f(x) = e^{\frac{x}{2}}$.

- (a) Determine the degree three Taylor polynomial, p_3 , for f centered at $a = 0$.
- (b) Use your work in (a) to determine a general order n Taylor polynomial, p_n for f .
- (c) Use p_3 to approximate a value for $e^{0.2}$.

SOLUTION:

By definition, $p_n(x) =$

Find the derivatives of $f(x)$ and evaluate them at 0.

$$f(x) = \qquad \qquad \qquad \text{and so } f(0) =$$

$$f'(x) = \qquad \qquad \qquad \text{and so } f'(0) =$$

$$f''(x) = \qquad \qquad \qquad \text{and so } f''(0) =$$

$$f'''(x) = \qquad \qquad \qquad \text{and so } f'''(0) =$$

$$\vdots \qquad \qquad \qquad \vdots$$

$$f^{(k)}(x) = \qquad \qquad \qquad \text{and so } f^{(k)}(0) =$$

Thus:

$$p_1(x) =$$

$$p_2(x) =$$

$$p_3(x) =$$

\vdots

$$p_n(x) =$$

Now $f(x) = e^{\frac{x}{2}}$, so what is x if we are trying to find $e^{0.2}$?