



3. Approximate the slope of the graph of  $f(x) = 2^x$  at  $x = 2$ , and use your approximation to find a formula for the tangent line to the graph of  $f(x)$  at  $x = 2$ .

4. Find

$$\frac{d}{dx} \frac{\sqrt{x}}{e^x}$$

5. Suppose the position of a particle after  $t$  seconds is given by

$$f(t) = t^2 e^t - 3e^t$$

Determine when the particle is speeding up and slowing down.

6. For the function  $f(x)$  pictured below, sketch  $f'(x)$  and a possible antiderivative  $F(x)$ . Justify each of your graphs by writing a sentence relating the sign, slope, and concavity of the graph of  $f(x)$  with the relevant features of your graphs.

