

1. (8 points) Solve the problems given below.

(a) (4 points) Given $f(x) = (x^5 + e^x)(x + 3)$, find $f'(x)$.

(b) (4 points) Find $\frac{d}{dt} \frac{t^2-1}{e^t}$.

2. (4 points) Determine the values of the following limits if possible; if they can not be evaluated, explain why.

(a) (2 points) $\lim_{x \rightarrow -\infty} \frac{-2x^3-3x}{x^2-4}$

(b) (2 points) $\lim_{x \rightarrow \infty} \frac{5x^4-2x^2+x}{2x^4+1}$

3. (4 points) Calculate $\frac{d}{dt} (3\sqrt{t} - \frac{5}{t^3})$.

4. (4 points) Given $f(x) = 3x^2 - 2$, use the difference quotient to calculate $f'(x)$.

5. (2 point bonus) Determine $\frac{d^{15}}{dx^{15}}(xe^x)$.