Part B: Calculators may be used.

Answer each question completely. Show all work. No credit is allowed for mere answers with no work shown. Show the steps of calculations. State the reasons that justify conclusions.

11. (10 points) Suppose y and x satisfy that

$$x + x^2y + y^2 = 7.$$

(a) Find dy/dx.

(b) Find the equation of the line tangent to the curve at the point $(1, 2)$.

12. (10 points) Suppose

$$f(x) = \frac{5}{3 - 2x}$$

Use the definition of the derivative as the limit of a difference quotient to compute $f'(x)$. No credit for use of the short rules.

13. (5 points) Find

$$\lim_{x\to\infty} \sqrt{\frac{10x^4+5x^3+1}{1+2x^4}}.$$

Give the exact answer.

14. (5 points) Find

$$\lim_{x\to 0} \frac{\sin 3x \ \cos 4x}{\sin 5x}$$

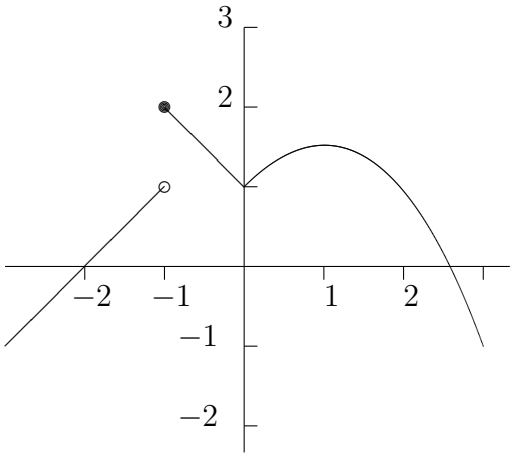
Give the exact answer.

15. (10 points) Use logarithmic differentiation to find dy/dx if

$$y = \frac{\sqrt{2x+3}\,(x^2+1)^4}{(e^x+1)^3}.$$

Show your work. You do not need to simplify the answer.

16. (10 points) Following is the graph of a function $f(x)$.



(a) Find $\lim_{x\to -1^-} f(x)$.

(b) Tell all x where $f(x)$ fails to be differentiable.

(c) Tell all x where $f(x)$ fails to be continuous.

(d) Tell where $f'(x) > 0$.

(e) Estimate $f'(-1/2)$.