

1710.200 Exam 1 Review

1) Compute the following limits or state that they do not exist.

a)

$$\lim_{x \rightarrow 2} \frac{2x^2 - x - 6}{x^2 - 4}$$

b)

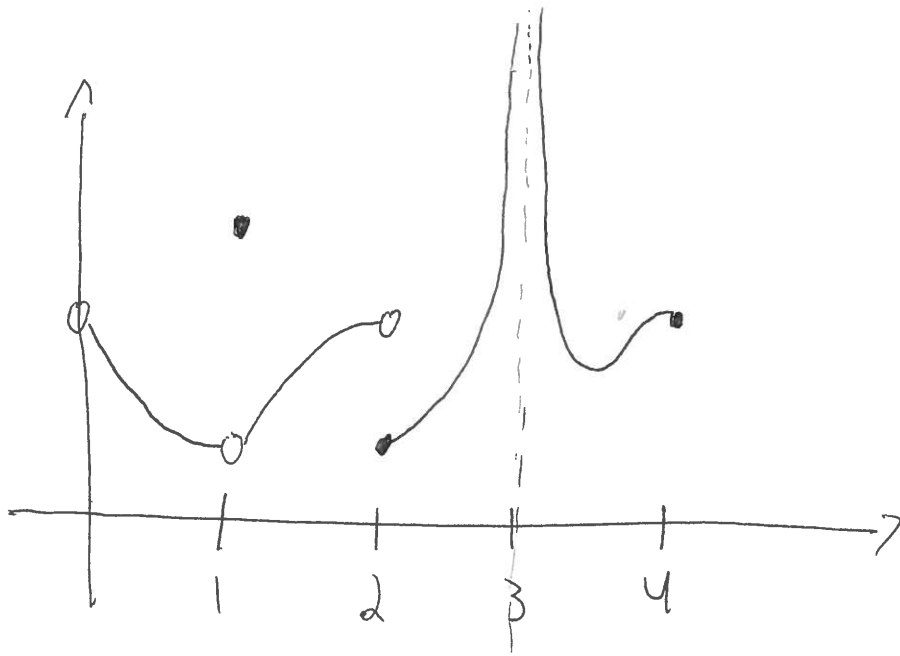
$$\lim_{x \rightarrow 1} \frac{x-1}{\sqrt{4x+5} - 3}$$

2) Find the vertical asymptotes, horizontal asymptotes, and slant asymptotes of the following functions. Sketch a graph of the function.

a) $f(x) = \frac{4x^2 - 6x - 4}{2x^2 + 4x + 2}$

b) $f(x) = \frac{x^2 - 6x + 5}{3x - 2}$

3) On what intervals is the following function continuous?



4) Compute $\frac{d}{dx}$ for the following expressions

a) $(x^3 + 5x + 2)\cos(x) + \frac{\sin(x)}{5\sqrt{x} + 3}$

b) $(\tan(x))^2 + (x^5 + 2)^{100}$

c) $\sec((x+4)^5)$

d) $\sin(x^2)x^3 + \frac{\cos(\sqrt{x})}{x^2 + 5}$

5) Find $\frac{dy}{dx}$. Write an equation for the tangent line at the point a

(i) $(x+y)^{2/3} = y$ $a = (4, 4)$

(ii) $xy + x^{3/2} y^{-1/2} = 2$ $a = (1, 1)$

6) (i) A jet ascends at a 10° angle from the horizontal with an airspeed of $550 \frac{\text{miles}}{\text{hour}}$ (its speed along its line of flight is $550 \frac{\text{miles}}{\text{hour}}$). How fast is the ~~altitude~~ altitude of the jet increasing? If the sun is directly overhead, how fast is the shadow of the jet moving on the ground?

(ii) Two boats leave a port at the same time. One travels west at $20 \frac{\text{miles}}{\text{hour}}$, the other travels south at $15 \frac{\text{miles}}{\text{hour}}$. At what rate is the distance between them changing 30 minutes after they leave the port?