

## Review for exam 2

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**Exercise 1.** Show that the functions are one-to-one and determine its inverse..

1.  $f(x) = \sqrt{3x^3 - 4}$ ,

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

**Exercise 2.** Find  $g'(a)$  where  $g$  is the inverse function of the given function

1.  $f(x) = 3 + x^5 + \tan(\pi x/2)$  at  $a = 3$ .

2.  $f(x) = \sin^{-1}(x)$  at  $x = 0.5$ .

3.  $f(x) = e^x$ ,  $x = 1$ .

**Exercise 3.** Find the limit of

1.  $\lim_{x \rightarrow \infty} \frac{2e^{2x} - 7e^{3x}}{3e^{4x} - 5e^{2x}}$ .

2.  $\lim_{x \rightarrow \infty} \frac{2e^{2x} - 7e^{3x}}{3e^{4x} - 5e^{2x}}$ .

3.  $\lim_{x \rightarrow 0} e^{\frac{\tan 3x}{\sin 5x}}$ .

**Exercise 4.** Find the derivative of

1.  $f(x) = \sqrt{\tan(e^{4x^2-4})}$ .

2.  $f(x) = \sec(e^{\tan(x^3)})$ .

3.  $f(x) = \frac{x^5 \csc(4x^3)}{e^{x^2-3x}}$

**Exercise 5.** Find  $f^{(12)}(x)$  for  $f(x) = e^{-3x}$ .

**Exercise 6.** Use a linearization to find an approximation of  $\tan^{-1}(1.1)$

**Exercise 7.** Find a quadratic approximation of  $\sec x$  at  $\pi/6$ .

Give an approximation of  $\sec(0.5)$ .

**Exercise 8.** Given the curve

$$x(t) = t(t^2 - 4), \quad y(t) = 3(t^2 - 4)$$

1. Find an equation of the tangent line at the point (3,-9).
2. At which point(s) is the tangent vertical? horizontal?
3. At which point does the curve cross itself?

**Exercise 9.** Find the second derivative  $y''$  if

$$e^{xy} = x - y$$

**Exercise 10.** Find a formula for  $f^{(23)}$  if  $f(x) = \sin 2x$ .

**Exercise 11.** Show that the curves

$$x^2 + y^2 = 5, \quad x - 2y = 0$$

are orthogonal.

**Exercise 12.** Find an equation of the tangent line to the curve

$$2 \cos(x - y) = e^{x+y}$$

at  $(\pi/6, -\pi/6)$ .

**Exercise 13.**