

Math 252 First Day Warm-Up

1. Find the derivatives of the following functions. Put your final answer in a simplified form.

a.  $f(x) = \frac{-4x^6}{5}$

f.  $f(x) = 3x^{3/4}$

b.  $f(x) = 3x^4e^{2x}$

g.  $f(x) = \sqrt{9 - 5x}$

c.  $f(x) = 8 \ln(x - 9)$

h.  $f(x) = 4 \sin(7x)$

d.  $f(x) = 6 \tan(2x)$

i.  $f(x) = 11x^4 - 2 \cos(3x)$

e.  $f(x) = 3 \tan^{-1}(4x)$

j.  $f(x) = \frac{x^9}{5x - 3}$

2. Evaluate the following limits. You do not need to use limit laws but you do need to give a solid justification for how you determined the limit. This justification may require algebraic simplification and/or verbal explanation.

ch 2.3 ex 10 a.  $\lim_{x \rightarrow \infty} \frac{\sin(x)}{x^2 + x - 1}$

ch 2.4 ex 7 d.  $\lim_{x \rightarrow \pi} e^{\sin^2(x)}$

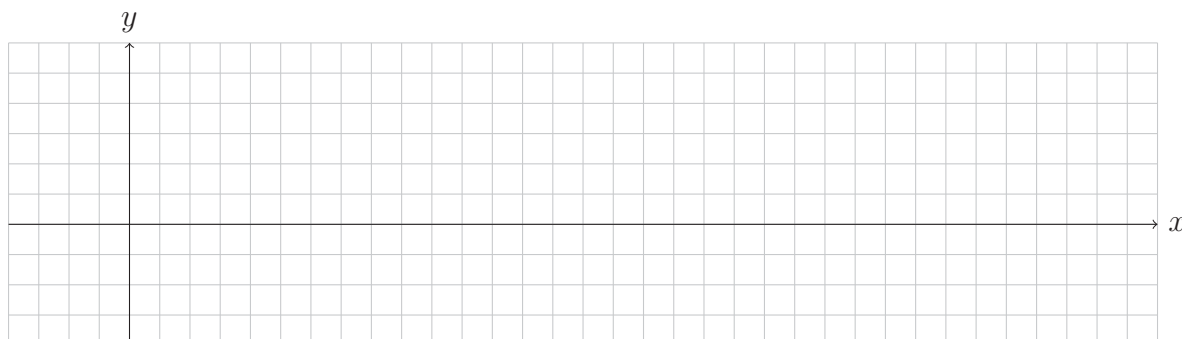
ch 2.5 ex 5 b.  $\lim_{t \rightarrow -\infty} \frac{3t^4 + 2t - 1}{-5t^4 + 2t^2 - 1}$

ch 2.5 ex 1 e.  $\lim_{x \rightarrow 1} \frac{x^2 - x - 6}{x^2 - 4x + 3}$

ch 2.5 ex 1 c.  $\lim_{x \rightarrow 3} \frac{x^2 + 2x - 3}{x^2 - 6x + 9}$  ch 3.6 ex 4, ch 2.5 ex 2 f.  $\lim_{x \rightarrow (\frac{\pi}{2})^-} \ln\left(\frac{1}{\tan(x)}\right)$

3. Find the absolute maximum and absolute minimum values of  $f(x) = x - \ln(x)$  on the closed interval  $\left[\frac{1}{2}, 2\right]$ .

4. For the function  $f(x) = 3x^{2/3} - x$ , determine the intercepts, find any vertical or horizontal asymptotes, the intervals of increase and decrease, the local maximum and minimum values and where they occur, the intervals of concavity and inflection points, the long run behavior of the graph, organize the information along a number line as shown in class or in a table as shown in the text and lab-manual, and then graph the function.



5. Write the following expressions as the sum and/or difference of logarithms. Express powers as factors.

a.  $\log_5 \left( \frac{x^2 + 2x + 1}{x^2} \right), x > 0$

b.  $\ln \left( \frac{2x + 3}{x^2 - 3x + 2} \right)^2, x > 2$

6. Write each expression as a single logarithm.

a.  $3 \log_4(x^2) + \frac{1}{2} \log_4 \sqrt{x}$

b.  $\ln \left( \frac{x-1}{x} \right) + \ln \left( \frac{x}{x+1} \right) - \ln(x^2 - 1)$

7. Find the exact value of the remaining 5 trigonometric functions given that  $\cos(\theta) = -\frac{3}{5}$  and  $\theta$  is in quadrant III.

8. Solve  $\sin(2\theta) + 1 = 0$ . Give all possible solutions in set notation.

9. Establish the following identity.

$$\frac{\cos(\theta)}{\cos(\theta) - \sin(\theta)} = \frac{1}{1 - \tan(\theta)}$$