



MATH 151- WEEK-IN-REVIEW 4

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EXAM 1 REVIEW

1. Evaluate the following limits.

$$(a) \lim_{x \rightarrow \infty} \frac{-10x^3 + 7x - 15}{3x^2}$$

$$(b) \lim_{x \rightarrow -\infty} \frac{x - 7}{3 + 2x^2}$$

$$(c) \lim_{x \rightarrow -\infty} \frac{x^3 - 2x}{3 - 2x^2 - 5x^3}$$

$$(d) \lim_{x \rightarrow -\infty} \frac{\sqrt{4x^6 + 7x - 1}}{x^3 + 9}$$

$$(e) \lim_{x \rightarrow \infty} \frac{\sqrt{4x^6 + 7x - 1}}{x^3 + 9}$$



$$(f) \lim_{x \rightarrow \infty} (\sqrt{4x^2 + 7x + 3} - 2x)$$

$$(g) \lim_{x \rightarrow -\infty} (\sqrt{4x^2 + 7x + 3} - 2x)$$

$$(h) \lim_{x \rightarrow \infty} e^{5-x}$$

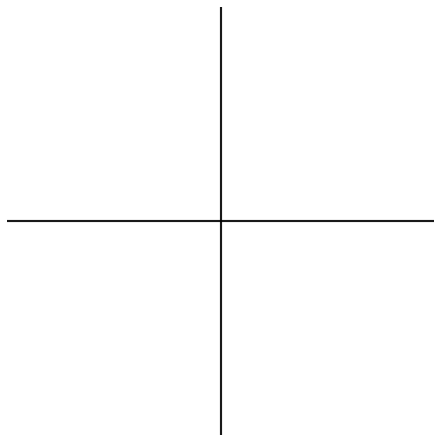


(i) $\lim_{x \rightarrow 5^+} e^{\frac{x}{5-x}}$

(j) $\lim_{x \rightarrow \infty} (\ln(3x^2 + 5) - \ln(7 + 6x^2))$

(k) $\lim_{x \rightarrow \infty} (\ln(3x^2 + 5) - \ln(7 + 6x))$

2. Graph the line represented by the parametric equations $x = 1 - 2t$, $y = 5t + 2$. Then write the Cartesian equation for the function.





3. Find the work done by a force (in Newtons) of $\mathbf{F} = \langle 2, 5 \rangle$ and moving an object 6 meters due east.

4. Consider the curve $x(t) = t - 2$, $y(t) = t^2 - 3$. (a) Is the point $(4, 40)$ on the graph of the curve?
(b) Eliminate the parameter to find a Cartesian equation.

5. Describe the shape of the curve given by $(2 + \cos(t))\mathbf{i} + (2 - \sin^2(t))\mathbf{j}$.



6. Two forces simultaneously act on an object sitting at the origin. The forces are given by $\mathbf{F}_1 = \langle 2, -1 \rangle$ and $\mathbf{F}_2 = \langle 3, 7 \rangle$. Find the magnitude and direction of the resultant vector. Measure the direction from the positive x -axis.
7. Find the vector projection of $\mathbf{b} = \langle -3, -2 \rangle$ onto $\mathbf{a} = \langle -1, 5 \rangle$
8. Find the distance from the point $(1, -4)$ to the line $3x + 2y = -2$.
9. Evaluate $\cos \left(\arcsin \left(-\frac{2}{7} \right) \right)$



10. Express $\csc(\tan(x))$ as an algebraic expression.

11. Find the vertical and horizontal asymptotes for the curve $f(x) = \frac{\sqrt{9x^6 + 1}}{x^3 - 4x^2 - 3x + 12}$.

12. Use the limit definition to find the derivative, $f'(x)$, for $f(x) = \sqrt{3 - 2x}$. No points will be awarded for not using the limit definition of the derivative.

Find the equation of the tangent line for the above function at $x = -1$.



13. Find the limit or prove it does not exist. Do not use L'Hôpital's Rule.

$$(a) \lim_{x \rightarrow 2} \frac{\frac{2}{2x+1} - \frac{2}{5}}{x-2}$$

$$(b) \lim_{x \rightarrow -3} \frac{2x^4 - 162}{x + 3}$$

$$(c) \lim_{x \rightarrow -4} \frac{3 + x}{(x + 4)^2}$$

$$(d) \lim_{x \rightarrow 1^-} \frac{x^2 + 3x - 4}{|1 - x|}$$



$$(e) \lim_{x \rightarrow -\infty} (e^{2x} + 1)$$

$$(f) \lim_{x \rightarrow \infty} \arctan \left(\frac{3 - 4x^3}{1 + 5x^2} \right)$$

$$(g) \lim_{x \rightarrow \infty} \frac{3e^{-5x} + 9e^{3x}}{7e^{-5x} - 3e^{3x}}$$

$$\lim_{x \rightarrow -\infty} \frac{3e^{-5x} + 9e^{3x}}{7e^{-5x} - 3e^{3x}}$$



14. Which of following intervals must contain a solution to the equation $2x^3 + 16x + 3 = 18$?

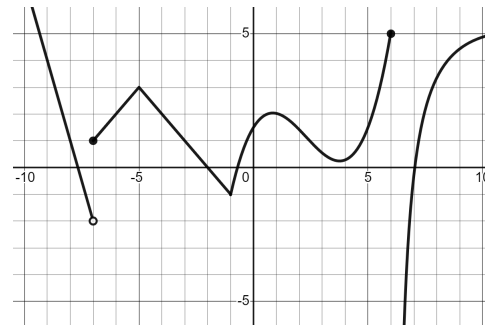
- (a) $[-2, -1]$
- (b) $[-1, 0]$
- (c) $[0, 1]$
- (d) $[1, 2]$
- (e) $[2, 3]$

15. Given $f(x) = \begin{cases} x^2 - 5a & \text{if } x < -1 \\ ax^2 & \text{if } -1 \leq x \leq 2 \\ 3ax + b & \text{if } x > 2 \end{cases}$. Find values for a and b that make the function continuous everywhere.

16. Given $-2x + 1 \leq f(x) \leq 3x^2$, compute $\lim_{x \rightarrow -1} f(x)$.



17. Determine the following limits given the graph of $f(x)$ to the right.



(a) $\lim_{x \rightarrow -7} f(x)$

(d) $\lim_{x \rightarrow 6^-} f(x)$

(b) $\lim_{x \rightarrow -1} f(x)$

(e) $\lim_{x \rightarrow 6^+} f(x)$

(c) $\lim_{x \rightarrow 1} f(x)$

(f) $\lim_{x \rightarrow 6} f(x)$

Is there anywhere $f(x)$ is discontinuous? If so, is it left continuous, right continuous, or neither?

Is there anywhere $f(x)$ is not differentiable?



18. Given $f'(x)$ to the right, choose the graph of $f(x)$.

