Math 151 - Hands On, Grades Up 10 (4.9-5.2; Exam 3 Review)

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Please scan the QR code below.

We will begin at 7PM. A problem will be displayed on the table monitors. Collaborate with your table on how to solve each problem. If you have a question, raise your hand. After several minutes, the solutions will be displayed on the wall monitors. Feel free to take a picture of the solution, as the solutions are not posted.

These problems can be found on the Math Learning Center website: https://mlc.tamu.edu/by-course/math-151#Hands-on,-Grades-Up.

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1. Find the most general antiderivative of the following functions.

   (a) $f(x) = \sqrt{x}(x-3)^2$

   (b) $f(x) = 2^x - \cos(x) + 6\sqrt[5]{x^7} + \sec x \tan x$

   (c) $f(x) = 10x + \dfrac{5}{\sqrt{1-x^2}} - \sec^2(x)$.

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2. Given that $f'(x) = \dfrac{x+3}{x^2}$ and that $f(1) = 3$, compute $f(3)$.

3. If $f''(x) = -\dfrac{1}{x^2} + 8$, $f'(1) = 6$, and $f(1) = 0$, compute $f(x)$.

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4. Approximate the area under the graph of $f(x) = 64 - x^2$ from $x = -5$ to $x = 3$ using 4 rectangles of equal width and left endpoints.

5. Express $\int_{-1}^{5} \ln(x+2)\,dx$ as the limit of a (right) Riemann sum.

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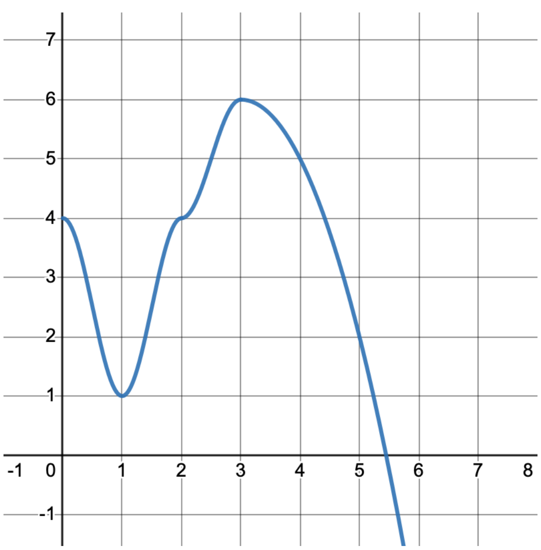
6. Evaluate $\displaystyle\int_{-2}^{2}\left(3-\sqrt{4-x^2}\right)\,dx$ by interpreting in terms of area.

7. Estimate the area under the graph of f below on $[0, 5]$ using 5 rectangles and right endpoints.



8. Determine the absolute minimum and absolute maximum values of the function $f(x) = \dfrac{x^2+4}{x}$ over the interval $[1, 5]$.

9. The velocity of a particle is given by $v(t) = t^3 - \frac{3}{2}t^2$. Determine the maximum and minimum **acceleration** of the particle on the interval $[0, 2]$.

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10. Suppose f has domain all real numbers except $x = 1$ and $f'(x) = \dfrac{(x+2)(3-x)^6 e^{x+3}}{(x-1)^3}$. Find the interval(s) where f is increasing/decreasing and the locations of any local extrema.

11. Suppose the function f has domain of all real numbers. If $f'(x) = e^{-x}(x^2 - 8)$, determine the intervals where f is concave up/down and the x-coordinates of any inflection points of $f(x)$.

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12. Suppose the function f has domain $(-\infty, 3) \cup (3, \infty)$. If $f''(x) = \dfrac{-x^2(x+4)}{(x-3)}$, determine the intervals where f is concave up/down and the x-coordinates of any inflection points of $f(x)$.

13. Let $f(x) = \dfrac{1}{x} - \dfrac{2}{x^2}$. Find the interval(s) where f is increasing/decreasing and the locations of any local extrema.

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14. Find the following limits.

(a) $\lim_{x \to 0^+} \dfrac{e^{x^2} - \tan x - 3^x}{x \cos(2x)}$

(b) $\lim_{x \to 0^+} (1 + 4\sin(x))^{\frac{2}{3x}}$

15. Determine the right endpoint, b, of the closed interval $[0, b]$ such that $c = \sqrt{3}$ satisfies the conclusion of the Mean Value Theorem for $f(x) = x^3 - x$.

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16. The bottom and side margins of a poster are each 1 in and the top margin is 2 in. The poster is to have a total area of 180 in^2. What dimensions of the poster will give the largest printed area? Verify your answer.

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