Name_____

Calculus Practice: Use Derivatives to Analyze Functions 5a

For each problem, find the open intervals where the function is increasing and decreasing.

1) $y = (-3x + 15)^{\frac{1}{2}}$

   A) Increasing: $(-\infty, 5)$ Decreasing: No intervals exist
   B) Increasing: $(-\infty, 3)$ Decreasing: $(3, \infty)$
   C) Increasing: No intervals exist. Decreasing: $(-\infty, 5)$
   D) Increasing: $(-\infty, 2)$ Decreasing: $(2, \infty)$

2) $y = -\dfrac{x^2}{4x - 8}$

   A) Increasing: $\left(-\infty, \dfrac{1}{3}\right), \left(\dfrac{4}{3}, \infty\right)$ Decreasing: $\left(\dfrac{1}{3}, \dfrac{2}{3}\right), \left(\dfrac{2}{3}, \dfrac{4}{3}\right)$
   B) Increasing: $(4, 8), (8, 16)$ Decreasing: $(-\infty, 4), (16, \infty)$
   C) Increasing: $(0, 2), (2, 4)$ Decreasing: $(-\infty, 0), (4, \infty)$
   D) Increasing: $(-\infty, 0), (4, \infty)$ Decreasing: $(0, 2), (2, 4)$

3) $y = \dfrac{1}{6}x^{\frac{7}{3}} - \dfrac{14}{3}x^{\frac{1}{3}} - 2$

   A) Increasing: $(-\infty, -8), (8, \infty)$ Decreasing: $(-8, 8)$
   B) Increasing: $\left(-\dfrac{2}{3}, \dfrac{2}{3}\right)$ Decreasing: $\left(-\infty, -\dfrac{2}{3}\right), \left(\dfrac{2}{3}, \infty\right)$
   C) Increasing: $(-\infty, -2), (2, \infty)$ Decreasing: $(-2, 2)$
   D) Increasing: $(-2, 2)$ Decreasing: $(-\infty, -2), (2, \infty)$

4) $f(x) = -\dfrac{9x^2 - 9}{x^3}$

   A) Increasing: $\left(-\dfrac{\sqrt{3}}{3}, \dfrac{1}{3}\right), \left(\dfrac{1}{3}, \dfrac{\sqrt{3}}{3}\right)$ Decreasing: $\left(-\infty, -\dfrac{\sqrt{3}}{3}\right), \left(\dfrac{\sqrt{3}}{3}, \infty\right)$
   B) Increasing: $(-\infty, -4\sqrt{3}), (4\sqrt{3}, \infty)$ Decreasing: $(-4\sqrt{3}, 4), (4, 4\sqrt{3})$
   C) Increasing: $(-\infty, -\sqrt{3}), (\sqrt{3}, \infty)$ Decreasing: $(-\sqrt{3}, 0), (0, \sqrt{3})$
   D) Increasing: $(-\sqrt{3}, 0), (0, \sqrt{3})$ Decreasing: $(-\infty, -\sqrt{3}), (\sqrt{3}, \infty)$

5) $f(x) = -2\sec(x); \ [-\pi, \pi]$

   A) Increasing: $\left(-\pi, -\dfrac{\pi}{2}\right), \left(-\dfrac{\pi}{2}, 0\right), \left(0, \dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \pi\right)$ Decreasing: No intervals exist
   B) Increasing: $\left(-\dfrac{3\pi}{2}, -\dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \dfrac{3\pi}{2}\right)$ Decreasing: $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right), \left(\dfrac{3\pi}{2}, 2\pi\right)$
   C) Increasing: $\left(-\pi, -\dfrac{\pi}{2}\right), \left(-\dfrac{\pi}{2}, 0\right)$ Decreasing: $\left(0, \dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \pi\right)$
   D) Increasing: $(0, \pi)$ Decreasing: $(-\pi, 0)$

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6) $y = \tan(2x)$; $[-\pi, \pi]$

   A) Increasing: $\left(-\pi, -\dfrac{\pi}{2}\right), \left(-\dfrac{\pi}{2}, 0\right)$ Decreasing: $\left(0, \dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \pi\right)$

   B) Increasing: $\left(-\pi, -\dfrac{3\pi}{4}\right), \left(-\dfrac{3\pi}{4}, -\dfrac{\pi}{4}\right), \left(-\dfrac{\pi}{4}, \dfrac{\pi}{4}\right), \left(\dfrac{\pi}{4}, \dfrac{3\pi}{4}\right), \left(\dfrac{3\pi}{4}, \pi\right)$ Decreasing: No intervals exist.

   C) Increasing: No intervals exist Decreasing: $\left(-\pi, -\dfrac{3\pi}{4}\right), \left(-\dfrac{3\pi}{4}, -\dfrac{\pi}{4}\right), \left(-\dfrac{\pi}{4}, \dfrac{\pi}{4}\right), \left(\dfrac{\pi}{4}, \dfrac{3\pi}{4}\right), \left(\dfrac{3\pi}{4}, \pi\right)$

   D) Increasing: $\left(-\dfrac{\pi}{2}, 0\right), \left(\dfrac{\pi}{2}, \pi\right)$ Decreasing: $\left(-\pi, -\dfrac{\pi}{2}\right), \left(0, \dfrac{\pi}{2}\right)$

7) $f(x) = -\cos(2x)$; $[-\pi, \pi]$

   A) Increasing: $(-\pi, 0)$ Decreasing: $(0, \pi)$

   B) Increasing: No intervals exist Decreasing: $\left(-\pi, -\dfrac{3\pi}{4}\right), \left(-\dfrac{3\pi}{4}, -\dfrac{\pi}{4}\right), \left(-\dfrac{\pi}{4}, \dfrac{\pi}{4}\right), \left(\dfrac{\pi}{4}, \dfrac{3\pi}{4}\right), \left(\dfrac{3\pi}{4}, \pi\right)$

   C) Increasing: $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right), \left(\dfrac{3\pi}{2}, 2\pi\right)$ Decreasing: $\left(-\dfrac{3\pi}{2}, -\dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \dfrac{3\pi}{2}\right)$

   D) Increasing: $\left(-\pi, -\dfrac{\pi}{2}\right), \left(0, \dfrac{\pi}{2}\right)$ Decreasing: $\left(-\dfrac{\pi}{2}, 0\right), \left(\dfrac{\pi}{2}, \pi\right)$

8) $f(x) = \sin(x)$; $[-\pi, \pi]$

   A) Increasing: $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right), \left(\dfrac{3\pi}{2}, 2\pi\right)$ Decreasing: $\left(-\dfrac{3\pi}{2}, -\dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \dfrac{3\pi}{2}\right)$

   B) Increasing: $\left(-\pi, -\dfrac{\pi}{2}\right), \left(-\dfrac{\pi}{2}, 0\right), \left(0, \dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \pi\right)$ Decreasing: No intervals exist

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9) $y = -2\csc(2x)$; $[-\pi, \pi]$

   A) Increasing: No intervals exist Decreasing: $\left(-\pi, -\dfrac{3\pi}{4}\right), \left(-\dfrac{3\pi}{4}, -\dfrac{\pi}{4}\right), \left(-\dfrac{\pi}{4}, \dfrac{\pi}{4}\right), \left(\dfrac{\pi}{4}, \dfrac{3\pi}{4}\right), \left(\dfrac{3\pi}{4}, \pi\right)$

   B) Increasing: $\left(-\pi, -\dfrac{\pi}{2}\right), \left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \pi\right)$ Decreasing: No intervals exist

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10) $f(x) = -\cot(2x)$; $[-\pi, \pi]$

   A) Increasing: $\left(-\dfrac{\pi}{2}, \dfrac{\pi}{2}\right), \left(\dfrac{3\pi}{2}, 2\pi\right)$ Decreasing: $\left(-\dfrac{3\pi}{2}, -\dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \dfrac{3\pi}{2}\right)$

   B) Increasing: $\left(-\pi, -\dfrac{\pi}{2}\right), \left(0, \dfrac{\pi}{2}\right)$ Decreasing: $\left(-\dfrac{\pi}{2}, 0\right), \left(\dfrac{\pi}{2}, \pi\right)$

   C) Increasing: $\left(-\pi, -\dfrac{\pi}{2}\right), \left(-\dfrac{\pi}{2}, 0\right), \left(0, \dfrac{\pi}{2}\right), \left(\dfrac{\pi}{2}, \pi\right)$ Decreasing: No intervals exist.

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