

MATH 1850 Sec 011 and 012

CALCULUS I

QUIZ 10

November 9, 2010

Name (Last, First) _____

1. Find the open intervals on which the function is increasing and decreasing.

$$f(x) = x^4 - 8x^2 + 16$$

$$f'(x) = 4x^3 - 16x = 0$$

$$x(x^2 - 4) = 0$$

$$x(x - 2)(x + 2) = 0$$

Hence $x = 0, -2, 2$

Pick a number in $(-\infty, -2)$. Let's pick -3 . $f'(-3) = 4 \cdot (-3)^3 - 16 \cdot (-3) = -108 + 48 = -60$ which is negative, hence $f(x)$ is decreasing on $(-\infty, -2)$.

Pick a number in $(-2, 0)$. Let's pick -1 . $f'(-1) = 4 \cdot (-1)^3 - 16 \cdot (-1) = -4 + 16 = 12$ which is positive, hence $f(x)$ is increasing on $(-2, 0)$.

Pick a number in $(0, 2)$. Let's pick 1 . $f'(1) = 4 \cdot (1)^3 - 16 \cdot (1) = 4 - 16 = -12$ which is negative, hence $f(x)$ is decreasing on $(0, 2)$.

Pick a number in $(2, \infty)$. Let's pick 3 . $f'(3) = 4 \cdot (3)^3 - 16 \cdot (3) = 108 - 48 = 60$ which is positive, hence $f(x)$ is increasing on $(2, \infty)$.

Hence $f(x)$ is increasing on $(-2, 0) \cup (2, \infty)$ and decreasing on $(-\infty, -2) \cup (0, 2)$.