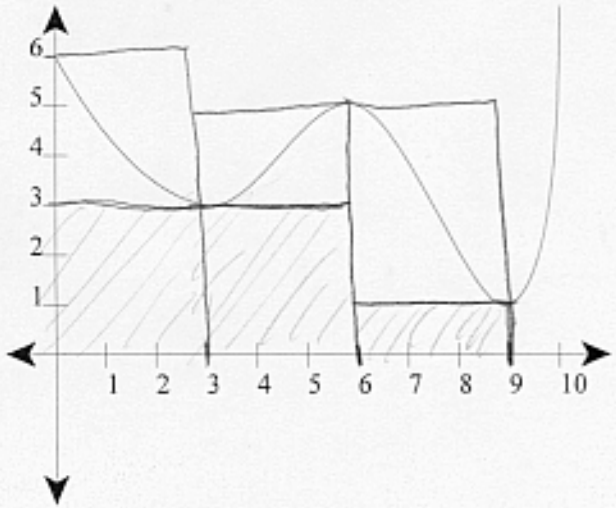
Quiz 12 Calculus 1 11/22/2002

Each problem is worth 5 points. Show complete justification for full credit.

1. By reading values from the graph of f(x) below, use three rectangles to find an upper estimate and a lower estimate for the area under the graph of f(x) but above the x axis between x=0 and x=9.



Upper

$3 \cdot f(0) + 3 \cdot f(6) + 3 \cdot f(6)$

$3 \cdot 6 + 3 \cdot 5 + 3 \cdot 5$

$18 + 15 + 15$

48

Great

Lower

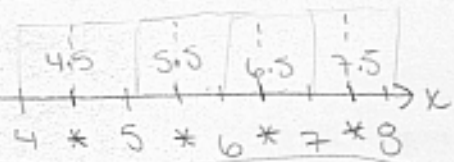
$3 \cdot f(3) + 3 \cdot f(3) + 3 \cdot f(9)$

$3 \cdot 3 + 3 \cdot 3 + 3 \cdot 1$

$9 + 9 + 3$

21

2. Use the midpoint rule with n=4 to approximate $\int_4^8 \sqrt{x^3 - 5x}\, dx$. [You don't need to simplify your answer – things like $\sqrt{(4\frac{1}{2})^3 - 5(4\frac{1}{2})}$ are perfectly acceptable here.]



$1 \cdot f(4.5) + 1 \cdot f(5.5) + 1 \cdot f(6.5) + 1 \cdot f(7.5)$

$\sqrt{(4.5)^3 - 5(4.5)} + \sqrt{(5.5)^3 - 5(5.5)} + \sqrt{(6.5)^3 - 5(6.5)} + \sqrt{(7.5)^3 - 5(7.5)}$

Nice!