

Pledge:

9/14/2006
Dr. Lunsford

MATH261 Calculus I
Quiz 4

Name: Solution
(20 Points Total)

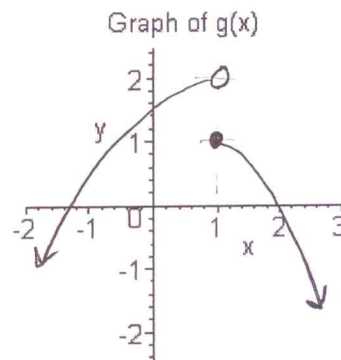
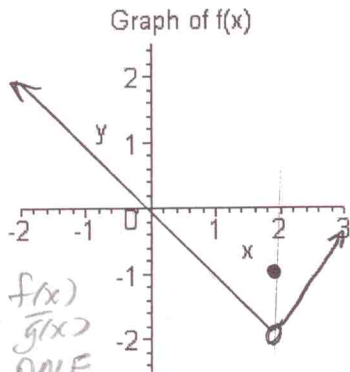
I. Use the graphs of the functions f and g to find the indicated limits. For each limit you must show at least one intermediate step for full credit. (2 points each, 4 points total)

$$1. \lim_{x \rightarrow 2} x^3 f(x) = \lim_{x \rightarrow 2} x^3 \cdot \lim_{x \rightarrow 2} f(x)$$

$$\lim_{x \rightarrow 2} f(x) = -2 \quad \downarrow \quad = 8(-2) = -16$$

$$2. \lim_{x \rightarrow 1} \frac{f(x)}{g(x)} \quad \text{cannot use quotient rule}$$

$$\lim_{x \rightarrow 1} \frac{f(x)}{g(x)} = \frac{-1}{1} = -1 \quad \left\{ \begin{array}{l} \lim_{x \rightarrow 1} \frac{f(x)}{g(x)} \\ \lim_{x \rightarrow 1} \frac{-f(x)}{g(x)} = \frac{-1}{2} = -1/2 \end{array} \right\} \therefore \lim_{x \rightarrow 1} \frac{f(x)}{g(x)} \text{ DNE}$$



II. Evaluate the following limits. For each limit you must show at least one intermediate step for full credit. (4 points each, 16 points total)

$$1. \lim_{t \rightarrow 1} (t^2 + 1)^3 (t + 3)^2 = (1 + 1)^3 (1 + 3)^2 = 2^3 4^2 = 8 \cdot 16 = 128$$

$$2. \lim_{w \rightarrow 1/2} \frac{4w^2 - 1}{1 - 2w} = \lim_{w \rightarrow 1/2} \frac{(2w - 1)(2w + 1)}{1 - 2w} = \lim_{w \rightarrow 1/2} [-(2w + 1)]$$

$\frac{0}{0}$ Indet. Form

$$= -(2(\frac{1}{2}) + 1) = -2$$

$\frac{a-b}{b-a} = -1$

$$3. \lim_{x \rightarrow 5} \frac{x - 5}{\sqrt{x + 4} - 3} \cdot \frac{\sqrt{x + 4} + 3}{\sqrt{x + 4} + 3} = \lim_{x \rightarrow 5} \frac{(x - 5)(\sqrt{x + 4} + 3)}{x + 4 - 9}$$

$\frac{0}{0}$ Indet. form

$$= \lim_{x \rightarrow 5} \frac{(x - 5)(\sqrt{x + 4} + 3)}{x - 5}$$

$$= \lim_{x \rightarrow 5} (\sqrt{x + 4} + 3) = \sqrt{9} + 3 = 6$$

$$4. \lim_{h \rightarrow 0} \frac{(4 + h)^{-1} - 4^{-1}}{h} = \lim_{h \rightarrow 0} \frac{(\frac{1}{4 + h} - \frac{1}{4})}{h} \cdot \frac{4(4 + h)}{4(4 + h)}$$

$\frac{0}{0}$ Indet. form

$$= \lim_{h \rightarrow 0} \frac{4 - (4 + h)}{h \cdot 4(4 + h)} = \lim_{h \rightarrow 0} \frac{-h}{4h(4 + h)}$$

$$= \lim_{h \rightarrow 0} \frac{-1}{4(4 + h)} = \frac{-1}{4(4 + 0)} = -\frac{1}{16}$$