

NAME _____ ID _____

MATHEMATICS 249 L07

MIDTERM

November 14, 2007

SHOW ALL WORK. Marks for each problem are to the left of the problem number.
NO CALCULATORS PLEASE.

[5] 1. Find $\lim_{x \rightarrow 1} \left(\frac{\sqrt{5-x} - 2}{2-2x} \right)$. (If it is possible to give the answer ∞ or $-\infty$, do so.)

[5] 2. USE THE LIMIT DEFINITION OF DERIVATIVE to find $\frac{d}{dx} \left(\frac{8}{6-x} \right)$.

[5] 3. Find y' where $y = \ln\left(\frac{x^2}{x^4 - 4}\right)$.

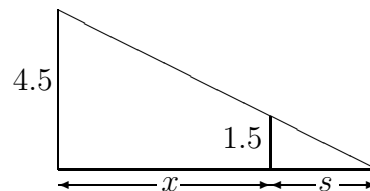
[6] 4. Use implicit differentiation to find y' where $e^y + e^{2x} = 8 - x \cos y$.

[5] 5. Find $\frac{d}{dx} (x^{1/3} \sin^2 x)$.

[6] 6. Find and simplify the equation of the tangent line to the curve $y = x\sqrt{2x-5}$ at the point on the curve where $x = 3$.

[8] 7. Do **ONE** of the following two problems.

(a) A woman 1.5 metres tall walks away from a 4.5-metre lamppost. The length s of her shadow cast by the lamp is increasing by 0.6 metres per second. Find the rate at which she is walking.



(b) For the function $f(x) = x^3 + 6x^2 - 15x + 8$, you are given that $f'(x) = 3x^2 + 12x - 15$. Find (i) the critical points, (ii) the intervals of increase and decrease, (iii) the local maxima and local minima.

NAME _____ ID _____

MATHEMATICS 249 L08

MIDTERM

November 15, 2007

SHOW ALL WORK. Marks for each problem are to the left of the problem number.
NO CALCULATORS PLEASE.

[5] 1. Find $\lim_{x \rightarrow -2} \left(\frac{4 - x^2}{3x^2 + x - 10} \right)$. (If it is possible to give the answer ∞ or $-\infty$, do so.)

[5] 2. USE THE LIMIT DEFINITION OF DERIVATIVE to find $\frac{d}{dx} (\sqrt{6-x})$.

[5] 3. Find y' where $y = \frac{x - \sqrt{x}}{\sin x}$.

[6] 4. Use implicit differentiation to find y' where $\cos(x + y) = 5 \ln x - 3y^5$.

[5] 5. Find $\frac{d}{dx} (e^{4x} \tan x)$.

[6] 6. Find and simplify the equation of the tangent line to the curve $y = \frac{x^{3/2}}{x-3}$ at the point on the curve where $x = 4$.

[8] 7. Do **ONE** of the following two problems.

(a) Sonya and Isaac are standing together on the snow in the centre of a frozen lake. At noon Isaac begins snowshoeing north at a speed of 2 km/hour. At 1:00 PM Sonya begins cross-country skiing west at a speed of 8 km/hour. At what rate is the distance between them increasing at 1:30 PM?

(b) For the function $f(x) = 2x^3 + x^2 - 4x - 1$, find (i) the critical points, (ii) the absolute maximum and absolute minimum of $f(x)$ for x in the interval $[-2, 0]$.