

MATH 1013: Applied Calculus I

Assignment 1 - 20 marks total
due Friday, June 4th (11:59pm)

Submission Instructions. Complete any FOUR (4) of the 6 questions below, each worth 5 marks. Your submission will be graded both on accuracy and clear and effective communication (mathematical, non-mathematical, written and visual). If you submit more than 4 solutions, we will grade the first four you submit.

You may consult with other classmates for inspiration, but your final submission must be written in your own words with your own thoughts and ideas.

1.(5 marks)

(a) Solve the inequalities

$$(1) |2x - 3| \leq 0.4$$

$$(2) 0 < |x-5| < 0.5$$

(b) Solve the equations for x

$$(3) |x+3| = |2x+1|$$

$$(4) \left| \frac{2x-1}{x+1} \right| = 3$$

(c) Solve the inequality in terms of intervals and illustrate the solution set on the real number line.

$$(5) x^3 + 4x < 4x^2$$

2- (5 marks)

(a) Use the Laws of Exponents to rewrite and simplify each expression.

$$(1) \frac{-2^6}{4^3}$$

$$(2) \frac{x^3 \cdot x^n}{x^{n+1}}$$

$$(3) \frac{\sqrt{a\sqrt{b}}}{\sqrt[3]{ab}}$$

(b) Find the domain of each function

$$(4) f(x) = \frac{1-e^{x^2}}{1-e^{1-x^2}}$$

$$(5) f(x) = \frac{1+x}{e^{\cos x}}$$

3. (5 marks) Find the exact value of each expression.

$$(a) \log_3 \left(\frac{1}{81} \right) \quad (b) e^{-2 \ln 5} \quad (c) e^{\ln(\ln e^3)} \quad (d) \ln \frac{1}{e^2}$$

$$(e) 2 \log_5 100 - 4 \log_5 50$$

4. (5 marks)

(a) Solve each equation for x . Give both an exact value and a decimal approximation, correct to three decimal places.

$$(1) \ln x + \ln(x-1) = 0 \quad (2) 1+e^{4x+1} = 20 \quad (3) \frac{60}{1+e^{-x}} = 4$$

(b) Solve each inequality for x .

$$(4) e^x > 5$$

$$(5) 1 - 2 \ln x < 3$$

5. (5marks)

(a) Find the exact value of each expression.

$$(1) \cot^{-1}(-\sqrt{3}) \quad (2) \cos \left(2 \sin^{-1} \left(\frac{5}{13} \right) \right) \quad (3) \csc^{-1} \sqrt{2}$$

(b) Simplify the expression

$$(4) \tan(\sin^{-1} x)$$

$$(5) \sin(2 \arccos x)$$

6. (5marks)-Prove the identity

$$(1) \cos\left(\frac{\pi}{2} - x\right) = \sin x \quad (2) (\sin x + \cos x)^2 = 1 + \sin 2x$$

$$(2) \tan^2 \alpha - \sin^2 \alpha = \tan^2 \alpha \sin^2 \alpha \quad (4) 2 \csc 2t = \sec t \csc t$$

Good Luck