MIDTERM 2

MATH 125   **Last name, first name:** _____

Section: _____

Student number: _____

Signature: _____

Please do not start working until instructed to do so.

You have 80 minutes.

You must show your work to receive full credit.

Scientific, but not graphing calculators are OK.

You may use one double-sided 8.5 by 11 sheet of handwritten (by you) notes.

Problem 1. _____

Problem 2. _____

Problem 3. _____

Problem 4. _____

Problem 5. _____

Total. _____

Problem 1.*(13 points total)* Compute the following integrals. Give your answer in exact form (do not use decimals).

a.*(6 points)* $\int \dfrac{2x - 3}{x^2 + 2x + 1}\, dx$

b.*(7 points)* $\int_{\pi/4}^{\pi/3} \dfrac{\ln(\tan\theta)}{\sin\theta\,\cos\theta}\, d\theta$

Problem 2.(*8 points total*) Compute the following integral. Give your answer in exact form (do not use decimals).

$$\int \frac{t^3}{\sqrt{t^2 + 4}}\, dt$$

Problem 3. *(9 points total)* Find a postitive number h such that the average value of the function

$$f(x) = x^2 - 5 - 2x$$

on the interval $[0, h]$ equals 1.

Problem 4. *(9 points)* Use Simpson's Rule with $n = 4$ subintervals to approximate the integral

$$\int_3^5 \frac{e^x}{x} \, dx.$$

Problem 5. *(11 points)* Determine whether each of the following integrals is convergent or divergent. If it is convergent, evaluate it.

a. *(5 points)* $\displaystyle\int_1^\infty \frac{2x+3}{x^2+3x+1}\, dx.$

b. *(6 points)* $\displaystyle\int_0^\infty xe^{-x}\, dx.$