MATH1040 Assignment 2

All questions should be submitted by 6pm on Wednesday 14 March. You should show full working where possible. Assignments are to be submitted during your tutorial. Make sure that your name and student number are on each sheet of your answers. Solutions will be distributed in class later.

1. Answer each of the following questions, showing all working.
   (a) Write $\sqrt{200}$ in simplest form.
   (b) Expand and simplify $(\sqrt{6} + \sqrt{2})(\sqrt{4} - \sqrt{6})$.
   (c) Find $x$ if $\sqrt{108} = x\sqrt{3}$
   (d) Find $x$ if $\sqrt{8x} = 2\sqrt{14}$
   (e) Solve $| -5x + 5 | = 4$.
   (f) Let $y = -2$. Find $x$ if $y = 4x + 5$.
   (g) Find $x$ if $5x + 4 = 3$.
   (h) Find $x$ if $\frac{2x}{4} - 9 = -2$.

2. Evaluate each of the following. Show all working. (Previous exam questions.)
   (a) $(-2)^{-4}$  (b) $-(2^{-4})$  (c) $-(x^2) + x$, where $x = -3$.
   (d) $(-x)^2 + x$, where $x = -3$.  (e) $-x^2 + x$, where $x = -3$.

3. Factorise and simplify $\frac{2x^2 + 4x}{x^2 + 2x}$

4. Expand each of:
   (a) $-3x(2x - 4)$  (b) $\sqrt{8}(\sqrt{6} + \sqrt{2})$  (c) $(2y - 1)(4y + 1)$

5. Colby the cheese tycoon imports beaver cheese from Venezuela.
   (a) Colby pays $4500 a tonne to the producers, and then must pay an extra 20% tax on the Venezuelan purchase price. To fund his gambling habit, Colby needs to sell the cheese at a mark-up of 100% (on the purchase price plus tax). How much profit does Colby make on each kilogram?
   (b) The future of the beaver cheese industry is uncertain. Due to a virulent outbreak of Bolivian Beaver Blight, Colby must now pay $5000 a tonne for beaver cheese, but has to keep the same selling price as before. Under new tax laws, Colby no longer has to pay the 20% tax on the purchase price, but he must now pay a tax of 10% on the selling price of every kilogram of cheese sold. Is Colby’s profit on each kilogram of cheese more or less than before? By how much?
   (c) Paris Hilton announces that she owes her good looks and high moral standing to the fact that she eats Venezuelan beaver cheese every day. Thus the demand for beaver cheese skyrocket, and Colby can raise his prices. What should his selling price be in order to make a profit of $7.60 per kilogram of cheese? Keep the same tax rate and purchase price as in Part (b).

6. After the recent cricket a depressed England supporter went to the pub. He drank 5 beers, each containing 1 unit of alcohol. Then he started drinking rum, each glass containing 3 units of alcohol.
   (a) Let $x$ be the number of glasses of rum he drinks. Write an expression, involving $x$, for the number of units of alcohol he drinks (don’t forget the beer!).
   (b) If he drinks 23 or more units of alcohol, he will pass out. If he drinks less than 14 units, he will stay too sober and will be depressed. Assume he doesn’t want to stay depressed and doesn’t want to pass out. Write the problem of deciding how many glasses of rum he can drink in inequality form.
   (c) Solve the inequalities in Part (b). Write your answer in interval form and mark it on a real line.

(continued over...)
7. The number of chirps that a cricket makes in one minute is a function of the temperature. As a result, it is possible to tell roughly how warm it is by using a cricket as a thermometer! A formula for temperature is: \( t = \frac{n}{8} + 6 \), where \( t \) represents the temperature in degrees Celsius, and \( n \) represents the number of cricket chirps in one minute.

(a) (i) If you hear 120 chirps per minute, what is the approximate temperature?
(ii) At what temperature do the crickets stop chirping?

(b) Famous chef Pierre le Frog has one speciality, Tepid Cricket Soup (which he serves with fava beans and a nice Chianti). Each bowl of soup contains ten crickets and is served at a temperature of 30° Celsius. Pierre knows the soup temperature by counting the total number of cricket chirps per minute. What is the total number of chirps per minute if a bowl of soup is to be served at exactly 30°?