Mathematics 115 – F09: Solutions to Assignment 1

Total Points: 20

(1) **52 p39 [2 pts]** Factorization of $x^2 + 6x + 5 = 0$ leads to $(x+5)(x+1) = 0$ which means that the domain consists of all real numbers such that $x \neq -5$ and $x \neq -1$

(2) **66 p48 (a)[2 pts]** Since we are given the angle, we can use the tan function to represent the adjacent side in terms of the opposite one

$$\tan(67^o) = \frac{h}{x};$$

therefore,

$$x = \frac{h}{\tan(67^o)}.$$

(b)[6 pts] The length of the adjacent side of the larger triangle is $1012 + x$, while the opposite side remains h, therefore we can write

$$\tan(24^o) = \frac{h}{1012 + x}.$$

From here we can isolate h:

$$h = \tan(24^o)(1012 + x)$$

$$h = 1012\tan(24^o) + x\tan(24^o).$$

We have already managed to express x using h and the tan of the smaller triangle in **(a)**. We substitute that relation here:

$$h = 1012\tan(24^o) + \frac{h}{\tan(67^o)}\tan(24^o)$$

$$h\left(1 - \frac{\tan(24^o)}{\tan(67^o)}\right) = 1012\tan(24^o)$$

$$h = \frac{1012\tan(24^o)}{\left(1 - \frac{\tan(24^o)}{\tan(67^o)}\right)}$$

$$h = 555.5672$$

(3) **60 p59 [5 pts]** The systolic blood pressure average equals the midline $k = 137$ $[mmHg]$, the amplitude $a = 6.7$ $[mmHg]$ is given, and the frequency $f = 0.079$ $[Hz]$ can be used to find

$$b = 2\pi f = 2\pi 0.079 = 0.4964.$$

Since the blood flow is at its highest at $t = 0$, we use cos with no phase shift for modeling the blood pressure:

$$p(t) = 6.7\cos(0.4964t) + 137.$$

(4) **46 p64 [5 pts]** The peak of this function is at time 0, therefore, it should be modeled by a cosine function. The amplitude here is $a = \frac{1-(-5)}{2} = 3$. The period is $T = 2$, and therefore, $b = \frac{2\pi}{T} = \pi$. The mid-line value is $k = -2$. Thus, the sinusoidal function is

$$y = 3\cos(\pi t) - 2.$$