# Solution to Assignment - 4

$$u(x,t) = L\left\{\operatorname{erf}\left(\frac{x-b}{\sqrt{2c^2t}}\right) - \operatorname{erf}\left(\frac{x-a}{\sqrt{2c^2t}}\right)\right\}.$$

2. $$u(x,t) = \frac{1}{2}\sqrt{\frac{3}{\pi t^3}}\int_{-\infty}^{\infty} f(\xi)\, e^{-3\frac{(x-\xi)^2}{4t^3}}\, d\xi.$$

3. $$u(x,t) = \frac{2}{\pi}\int_0^{\infty}\left[\frac{\sin\omega}{\omega} - \frac{1-\cos\omega}{\omega^2}\right]\cos(\omega x)\, e^{-\omega^2 t}\, d\omega.$$

4. $$u(x,t) = \sin\pi x\left(\cos\pi t - \frac{\sin\pi t}{\pi}\right).$$

6. $$u(x,t) = \begin{cases}\sin\omega(t-x); & t > x. \\ 0 & ; \ t < x.\end{cases}$$

8. $$u(x,y) = \frac{4}{\pi}\int_0^{\infty}\frac{\cosh(\omega x) - \coth(\omega l)\sinh(\omega x)}{4+\omega^2}\cos\omega y\, d\omega.$$

9. $$u = u_0\operatorname{erfc}\left(\frac{x}{2\sqrt{t}}\right); \quad v = \frac{u_0 x}{2\sqrt{\pi}}\, t^{-\frac{3}{2}}\, e^{-\frac{x^2}{4t}}.$$

10. $$y(x,t) = x^2(1-e^{-t}).$$

7. $$u(x,y) = \frac{1}{\pi}\left(\tan^{-1}\left(\frac{b-x}{y}\right) - \tan^{-1}\left(\frac{a-x}{y}\right)\right).$$

5. $$u(x,t) = \cancel{\frac{\alpha^2}{\omega^2}(1-\cos\omega t) - \frac{\alpha^2}{\omega^2}\left[\left\{1-\cos\omega\left(t-\frac{x}{\alpha}\right)\right\}H\left(t-\frac{x}{\alpha}\right)\right]}$$

$$= \frac{\alpha^2}{\omega^2}(1-\cos\omega t) - \frac{\alpha^2}{\omega^2}\left[\left\{1-\cos\omega\left(t-\frac{x}{\alpha}\right)\right\}H\left(t-\frac{x}{\alpha}\right)\right]$$