Corrección de la Segunda Prueba

1. Resolver las siguientes EDP(Ecuaciones Diferenciales Parciales)

   (a) $u_x = u_y + u$

   (b) $a^2 \frac{d^2u}{dx^2} = \frac{d^2u}{dt^2}$

   Desarrollo

   (a) $u_x = u_y + u$

$$X^{'}Y = Y^{'}X + XY$$
$$\frac{X^{'}}{X} = \frac{Y^{'}+Y}{Y} = -\lambda$$

$$\lambda = 0$$

$$\begin{array}{cc} X^{'} = 0 & Y^{'} + Y = 0 \\ D = 0 & D + 1 = 0 \\ & D = -1 \\ X_{(x)} = C_1 & Y_{(y)} = C_2 e^{-y} \end{array}$$

$u = X_{(x)}Y_{(y)} = C_1(C_2e^{-y})$
$u = X_{(x)}Y_{(y)} = C_1C_2e^{-y}$

$$\lambda = \alpha^2$$

$$\begin{array}{cc} X^{'} + \alpha^2 X = 0 & Y^{'} + Y + \alpha^2 Y = 0 \\ & D + 1 + \alpha^2 = 0 \\ D + \alpha^2 = 0 & D = -1 - \alpha^2 \\ X_{(x)} = C_1 e^{-\alpha^2 x} & Y_{(y)} = C_2 e^{-y-\alpha^2 y} \end{array}$$

$u = X_{(x)}Y_{(y)} = C_1e^{-\alpha^2 x}C_2e^{-y-\alpha^2 y}$

$$\lambda = -\alpha^2$$

$$\begin{array}{cc} X^{'} - \alpha^2 X = 0 & Y^{'} + Y - \alpha^2 Y = 0 \\ & D + 1 - \alpha^2 = 0 \\ D - \alpha^2 = 0 & D = -1 + \alpha^2 \\ X_{(x)} = C_1 e^{\alpha^2 x} & Y_{(y)} = C_2 e^{-y+\alpha^2 y} \end{array}$$

$u = X_{(x)}Y_{(y)} = C_1e^{-\alpha^2 x}C_2e^{-y-\alpha^2 y}$

2. $a^2 \frac{d^2u}{dx^2} = \frac{d^2u}{dt^2}$

$$a^2 X^{''} t = X t^{''}$$
$$a^2 \frac{X^{''}}{X} = \frac{t^{''}}{t} = -\lambda$$

$$a^2 X^{''} + \lambda X = 0 \qquad t^{''} + \lambda t = 0$$

$$\lambda = 0$$

$$\begin{array}{cc}
a^2X^{''} = 0 & t^{''} = 0 \\
a^2D^2 = 0 & D^2 = 0 \\
D = 0 & D = 0 \\
X_{(x)} = C_1 + C_2x & Y_{(y)} = C_3 + C_4y
\end{array}$$

$u = X_{(x)}Y_{(y)} = (C_1 + C_2x)(C_3 + C_4y)$

$$\lambda = \alpha^2$$

$$\begin{array}{cc}
a^2X^{''} + \alpha^2X = 0 & t^{''} + \alpha^2t = 0 \\
a^2D^2 + \alpha^2 = 0 & D^2 + \alpha^2 = 0 \\
D^2 = -\frac{\alpha^2}{a^2} & D^2 = -\alpha^2 \\
D = \pm\frac{\alpha}{a}j & D = \pm\alpha \\
X_{(x)} = C_1\cos(\frac{\alpha}{a}x) + C_2\sin(\frac{\alpha}{a}x) & Y_{(y)} = C_3\cos(\alpha y) + C_4\sin(\alpha y)
\end{array}$$

$u = X_{(x)}Y_{(y)} = (C_1\cos(\frac{\alpha}{a}x) + C_2\sin(\frac{\alpha}{a}x))(C_3\cos(\alpha y) + C_4\sin(\alpha y))$

$$\lambda = -\alpha^2$$

$$\begin{array}{cc}
a^2X^{''} - \alpha^2X = 0 & t^{''} - \alpha^2t = 0 \\
a^2D^2 - \alpha^2 = 0 & D^2 - \alpha^2 = 0 \\
D^2 = \frac{\alpha^2}{a^2} & D^2 = \alpha^2 \\
D = \pm\frac{\alpha}{a}j & D = \pm\alpha \\
X_{(x)} = C_1e^{\frac{\alpha}{a}x} + C_2e^{-\frac{\alpha}{a}x} & Y_{(y)} = C_3e^{\alpha x} + C_4e^{-\alpha x}
\end{array}$$

$u = X_{(x)}Y_{(y)} = (C_1e^{\frac{\alpha}{a}x} + C_2e^{-\frac{\alpha}{a}x})(C_3e^{\alpha x} + C_4e^{-\alpha x})$