一、选择题

1.D
2.C

二、填空题

1.$\frac{1}{4\sqrt{y}}, 0 < y < 4.$
2.0

三、解答题

1.(1) 从分布函数可得

$$X = -2 \quad p = 0.2$$
$$X = -1 \quad p = 0.3$$
$$X = 2 \quad p = 0.2$$
$$X = 3 \quad p = 0.3$$

X	-2	-1	2	3
P	0.2	0.3	0.2	0.3

(2)

Y	1	2	3
P	0.3	0.4	0.3

2.(1) 取 $y > -1$. 那么

$$F_Y(y) = P(Y \le y) = P(2X - 1 \le y) = P(X \le \frac{1}{2}y + \frac{1}{2})$$
$$= \int_0^{\frac{1}{2}y+\frac{1}{2}} e^x dx$$
$$= 1 - e^{-\frac{1}{2}y-\frac{1}{2}}$$
$$\Rightarrow f_Y(y) = \frac{1}{2}e^{-\frac{1}{2}y-\frac{1}{2}}.$$

(2) 取 $y > 1$. 那么

$$F_Y(y) = P(Y \le y) = P(e^X \le y) = P(X \le \ln y) = F_X(\ln y)$$
$$= \int_0^{\ln y} e^{-x} dx \Rightarrow f_Y(y) = \frac{1}{y^2}.$$

(3) 取 $y > 0$. 那么

$$F_Y(y) = P(Y \le y) = P(X^2 \le y) = P(-\sqrt{y} \le X \le \sqrt{y})$$

$$= \int_0^{\sqrt{y}} e^{-x} dx$$

$$\Rightarrow f_Y(y) = \frac{1}{2\sqrt{y}} e^{-\sqrt{y}}.$$

3.

$$F_Y(y) = P(Y \le y) = P(X^2 \le y) = P(-\sqrt{y} \le X \le \sqrt{y})$$

当 $0 \le y \le 1$ 时,

$$F_Y(y) = \frac{\sqrt{y}}{2}$$

$$\Rightarrow f_Y(y) = \frac{1}{4\sqrt{y}}.$$

当 $1 < y < 9$ 时,

$$F_Y(y) = \frac{1 + \sqrt{y}}{4}$$

$$\Rightarrow f_Y(y) = \frac{1}{8\sqrt{y}}.$$

综上,

$$f_Y(y) = \begin{cases} \frac{1}{4\sqrt{y}} & 0 \le y \le 1 \\ \frac{1}{8\sqrt{y}} & 1 < y < 9 \\ 0 & \text{其它.} \end{cases}$$