

2019-DSE-MATH-EP(M2)-Q02

2(a)

$$\begin{aligned}P(x) &= (x + \lambda)(x + \lambda)^2(x + \lambda)^3 + 12 - 15(x + \lambda) - 8(x + \lambda)^2 \\&= (x + \lambda)^6 + 12 - 15(x + \lambda) - 8(x + \lambda)^2\end{aligned}$$

Therefore,

$$\text{Coefficient of } x^3 = \binom{6}{3}\lambda^3$$

$$\Rightarrow 20\lambda^3 = 160$$

$$\Rightarrow \lambda^3 = 8$$

$$\Rightarrow \lambda = 2$$

2(b)

$$\begin{aligned}P(x) &= (x + \lambda)^6 + 12 - 15(x + \lambda) - 8(x + \lambda)^2 \\&\Rightarrow P'(x) = 6(x + \lambda)^5 - 15 - 16(x + \lambda) \\&\Rightarrow P'(0) = 6\lambda^5 - 15 - 16\lambda \\&\Rightarrow P'(0) = 6(2)^5 - 15 - 16(2) \\&\Rightarrow P'(0) = 192 - 15 - 32 = 145\end{aligned}$$