

The figure displays three sets of curves for polynomial degrees from 1 to 20. The x-axis is labeled 'Polynomial degree' and ranges from 2.5 to 20.0. The y-axis represents error metrics. The legend identifies the following series:

- MSE, lambda: 1e-08** (Solid dark blue line): Shows a significant increase in error as the polynomial degree increases, peaking around degree 18.
- bias** (Dashed dark blue line): Remains relatively stable, slightly increasing with degree.
- variance** (Dash-dot dark blue line): Shows a sharp increase in error starting around degree 15, peaking around degree 18.
- MSE, lambda: 0.0001** (Solid light green line): Shows a slight increase in error with degree.
- bias** (Dashed light green line): Remains relatively stable, slightly increasing with degree.
- variance** (Dash-dot light green line): Remains relatively stable, slightly increasing with degree.
- MSE, lambda: 0.01** (Solid dark red line): Shows a slight decrease in error with degree.
- bias** (Dashed dark red line): Remains relatively stable, slightly increasing with degree.
- variance** (Dash-dot dark red line): Remains relatively stable, slightly increasing with degree.

The plot illustrates the bias-variance tradeoff. For a fixed polynomial degree, increasing the regularization parameter  $\lambda$  (from  $1e-08$  to  $0.01$ ) reduces the variance and increases the bias, leading to a lower overall MSE. Conversely, for a fixed  $\lambda$ , increasing the polynomial degree increases the variance, which can lead to a higher overall MSE if the degree is too high (overfitting).

