Table 2: Exact Match (*i.e.*, the recommended code is equal to the oracle) and CrystalBleu scores achieved by the different techniques when patching vulnerable C functions. In dark-grey boxes we report the highest value for both metrics when producing *K*=1, *K*=3, *K*=5, and *K*=10 candidate patches. In boldface the best prompt fine-tuning template within each pre-training strategy.

Model-ID	Training Procedure		Top-1		Top-2		Top-3		Top-4		Top-5		Top-10	
	Pre-training	Fine-tuning	EM	CB	EM	CB	EM	CB	EM	CB	EM	CB	EM	CB
M0	✗	Supervised	0%	0%	0%	0%	0%	0%	0.011%	0.011%	0.023%	0.023%	0.082%	0.083%
M1 [24]	Self-supervised	Supervised	3.34%	40.18%	4.95%	41.94%	5.72%	42.10%	6.20%	41.57%	6.54%	41.14%	6.90%	38.58%
M2	Self-supervised + Supervised	Supervised	12.28%	47.98%	16.04%	50.37%	17.58%	50.21%	18.17%	49.98%	18.64%	49.61%	18.82%	47.26%
$M3_{S1}$	Self-supervised	Soft prompt-tuning	5.48%	50.52%	6.84%	51.13%	7.02%	51.53%	7.02%	51.44%	7.02%	51.22%	7.13%	50.80%
$M3_{S2}$	Self-supervised	Soft prompt-tuning	6.43%	50.96%	7.02%	51.98%	**7.43%**	52.53%	7.43%	52.52%	**7.55%**	51.92%	**7.70%**	51.37%
$M3_{S3}$	Self-supervised	Soft prompt-tuning	6.01%	50.00%	6.72%	51.36%	7.13%	51.32%	7.20%	51.12%	7.31%	50.71%	7.37%	49.64%
$M3_{S4}$	Self-supervised	Soft prompt-tuning	6.66%	**52.51%**	7.02%	**53.17%**	7.31%	**53.35%**	7.49%	**52.97%**	7.37%	**52.48%**	7.55%	**51.95%**
$M3_{S5}$	Self-supervised	Soft prompt-tuning	**6.78%**	51.35%	**7.25%**	52.23%	7.37%	52.11%	7.43%	52.28%	7.43%	52.04%	7.37%	51.50%
$M3_{H1}$	Self-supervised	Hard prompt-tuning	3.83%	40.24%	5.20%	41.96%	5.60%	41.59%	6.01%	41.34%	6.37%	41.13%	6.78%	38.36%
$M3_{H2}$	Self-supervised	Hard prompt-tuning	3.60%	**40.96%**	4.66%	41.93%	5.48%	41.78%	6.49%	41.85%	6.49%	41.20%	6.72%	38.54%
$M3_{H3}$	Self-supervised	Hard prompt-tuning	3.71%	40.75%	4.80%	**42.22%**	5.36%	41.71%	5.66%	41.42%	6.25%	40.81%	6.54%	38.54%
$M3_{H4}$	Self-supervised	Hard prompt-tuning	**4.01%**	40.69%	**5.36%**	41.90%	**6.13%**	41.95%	**6.66%**	41.85%	**7.02%**	40.92%	**7.55%**	39.04%
$M3_{H5}$	Self-supervised	Hard prompt-tuning	3.60%	39.77%	5.13%	41.73%	5.78%	**42.00%**	6.20%	**42.07%**	6.32%	**41.30%**	**7.55%**	**39.80%**
$M4_{S1}$	Self-supervised + Supervised	Soft prompt-tuning	8.96%	55.28%	10.26%	56.04%	10.67%	56.13%	10.85%	56.10%	10.97%	55.87%	10.91%	55.12%
$M4_{S2}$	Self-supervised + Supervised	Soft prompt-tuning	**9.43%**	54.45%	10.26%	56.16%	10.85%	56.11%	11.10%	56.13%	11.15%	55.83%	11.26%	55.15%
$M4_{S3}$	Self-supervised + Supervised	Soft prompt-tuning	8.67%	53.86%	**10.50%**	55.43%	**11.10%**	55.27%	10.85%	54.78%	11.15%	54.77%	11.26%	53.55%
$M4_{S4}$	Self-supervised + Supervised	Soft prompt-tuning	8.90%	54.13%	**10.50%**	55.44%	11.03%	55.56%	**11.26%**	56.02%	**11.56%**	55.89%	**11.62%**	54.34%
$M4_{S5}$	Self-supervised + Supervised	Soft prompt-tuning	8.84%	53.77%	9.91%	55.10%	10.73%	55.32%	10.91%	55.15%	11.10%	55.04%	11.26%	53.75%
$M4_{H1}$	Self-supervised + Supervised	Hard prompt-tuning	**13.21%**	49.38%	**17.16%**	51.11%	**18.29%**	51.82%	**18.87%**	51.56%	**19.46%**	50.86%	**20.11%**	48.67%
$M4_{H2}$	Self-supervised + Supervised	Hard prompt-tuning	12.33%	48.26%	15.92%	50.51%	17.34%	50.31%	18.46%	50.80%	18.70%	50.23%	19.29%	47.77%
$M4_{H3}$	Self-supervised + Supervised	Hard prompt-tuning	12.33%	50.61%	16.28%	50.61%	17.70%	50.65%	18.30%	50.65%	18.93%	50.40%	19.58%	47.64%
$M4_{H4}$	Self-supervised + Supervised	Hard prompt-tuning	11.97%	48.04%	15.69%	50.55%	17.52%	51.13%	18.46%	50.80%	18.87%	50.23%	19.58%	48.16%
$M4_{H5}$	Self-supervised + Supervised	Hard prompt-tuning	12.03%	48.15%	16.10%	50.46%	17.46%	50.81%	17.75%	50.22%	18.05%	49.48%	18.76%	47.17%