Programming for Performance

Lab Session 1: Catch the Bugs.

1. This problem tests your understanding of memory bugs. Each of the code sequences below may or may not contain memory bugs. The code all compiles without warnings or errors. If you think there is a bug, please circle **YES** and indicate the type of bug from the list below of memory bugs. Otherwise, if you think there are no memory bugs in the code, please circle **NO**.

Bugs:
1. Potential buffer overflow error
2. Memory leak
3. Potential for dereferencing a bad pointer
4. Incorrect use of free
5. Incorrect use of realloc
6. Misaligned access to memory
7. Other memory bug

Part A
```
/*
 * strndup - An attempt to write a safe version of strdup
 *
 * Note: For this problem, assume that if the function returns a
 * non-NULL pointer to dest, then the caller eventually frees the dest
        buffer.
 */
char *strndup(char *src, int max)
{
        char *dest;
        int i;

        if (!src || max <= 0)
             return NULL;
        dest = malloc(max+1);
        for (i=0; i < max && src[i] != 0; i++)
             dest[i] = src[i];
        dest[i] = 0;
        return dest;
}
```

NO   **YES**   Type of bug:_____

Part B
```
/* Note: For this problem, asssume that if the function returns a non-
NULL
 * pointer to node, then the caller eventually frees node. */
struct Node {
        int data;
```

```
        struct Node *next;
};
struct List {
        struct Node *head;
};
struct Node *push(struct List *list, int data)
{
        struct Node *node = (struct Node *)malloc(sizeof(struct Node));
        if (!(list && node))
                return NULL;
        node->data = data;
        node->next = list->head;
        list->head = node;
        return node;
}
```

NO   **YES**   Type of bug: _____

Part C

```
/* print_shortest - prints the shortest of two strings */
void print_shortest(char *str1, char *str2)
{
        printf("The shortest string is %s\n", shortest(str1, str2));
}
char *shortest(char *str1, char *str2)
{
        char *equal = "equal";
        int len1 = strlen(str1);
        int len2 = strlen(str2);
        if (len1 == len2)
                return equal;
        else
                return (len1 < len2 ? str1 : str2);
}
```

NO   **YES**   Type of bug: _____