

# 15-213

*“The course that gives CMU its Zip!”*

## Verifying Programs with BDDs

### Topics

- Representing Boolean functions with Binary Decision Diagrams
- Application to program verification

# Verification Example

```
int abs(int x) {  
    int mask = x>>31;  
    return (x ^ mask) + ~mask + 1;  
}
```

```
int test_abs(int x) {  
    return (x < 0) ? -x : x;  
}
```

**Do these functions produce identical results?**

**How could you find out?**

**How about exhaustive testing?**

# More Examples

```
int addXY(int x, int y)
{
    return x+y;
}
```

?  
=

```
int addYX(int x, int y)
{
    return y+x;
}
```

```
int mulXY(int x, int y)
{
    return x*y;
}
```

?  
=

```
int mulYX(int x, int y)
{
    return y*x;
}
```