# Quiz 1 Solutions

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1. Are these primitive expressions or call expressions?

   - primitive / call     3
   - primitive / call     add(2, 3)
   - primitive / call     print(5)
   - primitive / call     3 + 4

2. When do we make a new frame in an environment diagram?
   We make a new frame whenever we call a *user-defined* function.

3. **hard!** Implement the function nearest_two, which takes a positive number x as input and returns the power of two $(\cdots, \frac{1}{8}, \frac{1}{4}, \frac{1}{2}, 1, 2, 4, 8, \cdots)$ that is nearest to x.

```python
def nearest_two(x):
    """Return the power of two that is nearest to x.
    >>> nearest_two(8)
    8.0
    >>> nearest_two(11.5) # closer to 8 than 16
    8.0
    >>> nearest_two(0.75) # tie between 0.5 and 1
    1.0
    """
    power_of_two = 1.0

    if x < 1:
        factor = 0.5
    else:
        factor = 2.0
    while abs(power_of_two * factor - x) < abs(power_of_two - x):
        power_of_two = power_of_two * factor
    if abs(power_of_two * 2 - x) == abs(power_of_two - x):
        power_of_two = power_of_two * 2

    return power_of_two
```

4. **hard!** Draw the environment diagram.

```
def swap(x, y):
    x, y = y, x
    return print('Swapped!', x, y)

x, y = 60, 1
a = swap(x, y)
swap(a, y)
```

http://goo.gl/Lp90MJ