

Solutions — Lesson 02

Worked answers for the homework tasks

Try the homework first. Networking labs reward muscle memory.

Task 1 — Solution

```
sudo ip route add 10.20.0.0/16 via 192.168.1.254 dev eth0
ip route get 10.20.5.5
# Expected: 10.20.5.5 via 192.168.1.254 dev eth0 src 192.168.1.50 ...
sudo ip route del 10.20.0.0/16
ip route get 10.20.5.5
# Expected: now resolves via the default route
```

Task 2 — Solution (client → router → server)

```
# 1. Namespaces
sudo ip netns add ns-client
sudo ip netns add ns-router
sudo ip netns add ns-server

# 2. Two veth pairs
sudo ip link add veth0 type veth peer name veth1
sudo ip link add veth2 type veth peer name veth3

# Move ends into the right namespaces
sudo ip link set veth0 netns ns-client
sudo ip link set veth1 netns ns-router
sudo ip link set veth2 netns ns-router
sudo ip link set veth3 netns ns-server

# 3. IPs and link state
sudo ip -n ns-client addr add 10.0.1.10/24 dev veth0
```

```
sudo ip -n ns-router addr add 10.0.1.1/24 dev veth1
sudo ip -n ns-router addr add 10.0.2.1/24 dev veth2
sudo ip -n ns-server addr add 10.0.2.10/24 dev veth3
for ns in ns-client ns-router ns-server; do
    sudo ip -n $ns link set lo up
done
sudo ip -n ns-client link set veth0 up
sudo ip -n ns-router link set veth1 up
sudo ip -n ns-router link set veth2 up
```

Common mistakes

- **Forgot to enable forwarding** — `net.ipv4.ip_forward=1` must be set *inside the router namespace*, not on the host. Without it, the router drops transit packets.
- **Forgot the return route** — `ns-server` needs a default route back to `10.0.2.1`. Without it, the echo-reply has nowhere to go and you'll see only one-way traffic in `tcpdump`.
- **Forgot to bring up lo** — required for many local sockets; safest to do it in every namespace.
- **Used the host's `ip route` instead of `ip -n ns-... route`** — easy slip; the host's table doesn't apply inside a namespace.

Pro tip:

`ip netns exec ns-router bash` drops you into a shell where every `ip` command runs inside that namespace by default. Less ceremony than `-n ns-router` on every command.