**Exercise 1: Multi-Year Privacy Breach Risk and Ethical Decision**

**Question:**  
A bank is debating whether to adopt a cheaper but riskier customer management system. Two options:

* **SecureCRM**: Setup = $400,000; breach probability = 1% annually; breach cost = $3M.
* **EconoCRM**: Setup = $120,000; breach probability = 7% annually; breach cost = $2.5M.

Assume a 4-year horizon. Should they choose SecureCRM or EconoCRM? Analyze ethically using **consequentialism** and **financial logic**.

**Solution:**

**Step 1: Calculate SecureCRM Expected Annual Loss**

0.01×3,000,000=30,0000

**Step 2: Total Expected Risk Cost over 4 Years (SecureCRM)**

4×30,000=120,000

**Step 3: Total Cost (Setup + Risk) for SecureCRM**

400,000+120,000=520,000

**Step 4: Calculate EconoCRM Expected Annual Loss**

0.07×2,500,000=175,000

**Step 5: Total Expected Risk Cost over 4 Years (EconoCRM)**

4×175,000=700,000

**Step 6: Total Cost (Setup + Risk) for EconoCRM**

120,000+700,000=820,000

**Step 7: Financial Comparison**

SecureCRM = $520K  
EconoCRM = $820K  
→ SecureCRM saves $300K over 4 years.

**Step 8: Ethical Evaluation (Consequentialism)**

* Consequentialism says choose the action with better outcomes.
* SecureCRM prevents greater harm (less breach likelihood → less customer harm).

**Step 9: Risk to Reputation**

EconoCRM leads to higher risk of public scandal if breaches happen → reputational cost not even factored yet.

**Step 10: Stakeholder Trust**

* SecureCRM fosters more trust → long-term customer retention and loyalty

**Final Conclusion:**

**SecureCRM is the better and more ethical choice.**

**Exercise 11: Privacy Cost Analysis for Free App Monetization**

**Question:**  
A mobile health app offers a free version but sells anonymized user data to ad companies. Here's the data:

* Users: 5,000,000
* Revenue per user from ads: $0.20/month
* Cost of maintaining privacy compliance: $1,200,000/year
* Paid version (no ads): $5/month
* Estimated conversion to paid version: 3%

Evaluate:

1. Is it profitable to continue the free ad-supported model?
2. What are the ethical concerns?
3. Recommend a strategy.

**Solution:**

**Step 1: Calculate Annual Ad Revenue**

Monthly revenue per user=0.20⇒Annual revenue/user=0.20×12=2.4⇒Total=2.4×5,000,000=$12,000,000

**Step 2: Subtract Privacy Compliance Cost**

Net Revenue=12,000,000−1,200,000=$10,800,000

**Step 3: Paid Model Scenario**

* Users switching: 3% of 5,000,000 = 150,000
* Revenue = 150,000 × 5 × 12 = $9,000,000
* No privacy risk → no extra cost

**Compare:**

* Ad Model: $10.8M with privacy risk
* Paid Model: $9M and privacy-safe

**Step 4: Ethical Concern (Consent and Exploitation)**

* **Users may not be fully informed**
* Health data is **sensitive**
* **Deontological view**: Selling user data without full, active consent = unethical
* **Utilitarian view**: Greater harm in long run from data misuse

**Step 5: Strategy Recommendation**

* Keep free version with **clear opt-in consent**
* Introduce “freemium” for limited use
* Incentivize shift to paid model for privacy-conscious users

**Exercise 12: Environmental Ethics of Data Centers**

**Question:**  
A tech company is building a new data center. Two options:

* **Option A**: Traditional – Cost: $10M; Annual energy: 20,000 MWh
* **Option B**: Green – Cost: $12M; Annual energy: 8,000 MWh
* Electricity Cost: $0.10/kWh
* Carbon Tax: $50/ton
* 1 MWh = 0.4 tons CO₂

Evaluate:

1. Which is cheaper after 5 years?
2. Which is more ethical (sustainability)?
3. What’s the total CO₂ savings?

**Solution:**

**Step 1: Energy Cost for 5 Years**

* Option A:  
  20,000×0.10×5=$100,000
* Option B:  
  8,000×0.10×5=$40,000

**Step 2: Carbon Emissions (tons)**

* Option A:  
  20,000×0.4=8,000 tons/year → 40,000 tons over 5 years
* Option B:  
  8,000×0.4=3,200 tons/year → 16,000 tons over 5 years
* Difference = **24,000 tons**

**Step 3: Carbon Tax Cost**

* A: 40,000×50=$2,000,000
* B: 16,000×50=$800,000

**Step 4: Total Cost Over 5 Years**

* A: 10M+100K+2M=$12.1M
* B: 12M+40K+800K=$12.84M

**→ Option A is cheaper by $740K**

**Step 5: Ethical Evaluation (Sustainability & Responsibility)**

* **24,000 tons less CO₂** = impact of ~5,000 cars/year
* Following **virtue ethics** (corporate responsibility)
* Stakeholder value: brand image, eco-conscious customers

**Final Recommendation:**

* Even if more expensive short-term, **Option B aligns with ethical sustainability goals** and long-term brand value.

**Exercise 13: Surveillance Ethics and Productivity**

**Question:**  
A company installs employee monitoring software. Data shows:

* Productivity gain: 8%
* Employee turnover increases by 5%
* Hiring cost per employee: $8,000
* Team size: 400
* Annual productivity revenue per employee: $90,000

Evaluate:

1. Net gain or loss
2. Ethical implications
3. Decision using logic and numbers

**Solution:**

**Step 1: Productivity Gain**

* 90,000×0.08=7,200 gain/employee
* Total gain = 7,200×400=$2,880,000

**Step 2: Extra Turnover Cost**

* 5% of 400 = 20 employees lost
* Cost = 20×8,000=$160,00020

**Step 3: Net Gain**

Total Gain=2,880,000−160,000=$2,720,000

**Step 4: Ethical Analysis**

* Surveillance can harm morale, privacy
* **Kantian View**: Using employees as productivity tools violates autonomy
* **Utilitarian View**: If handled transparently, might be justified

**Step 5: Better Alternatives**

* Offer opt-in transparency
* Use feedback systems instead of constant surveillance

**Exercise 15: Misinformation Spread Cost on Social Platforms**

**Question:**  
A platform allows viral political content. Study shows:

* 2% of political posts are misinformation
* 1M political posts/day → 20,000 misinfo posts
* Public backlash causes 3% drop in active users/month
* Total users: 50M
* Revenue per user/month: $3

Evaluate:

1. Monthly revenue loss
2. Should the platform invest $5M/year in better fact-checking?
3. Use utilitarian ethics

**Solution:**

**Step 1: User Drop**

* 3% of 50M = 1.5M users lost
* Revenue loss = 1.5M × $3 = **$4.5M/month** = $54M/year

**Step 2: Investment Cost**

* New system cost = $5M/year
* Expected reduction in user loss = 70%
* Saved loss = 0.7 × 54M = **$37.8M saved**

**Step 3: Net Benefit**

* Net = 37.8M - 5M = **$32.8M gain**

**Step 4: Ethical Evaluation**

* **Utilitarian View**:  
  Reduces societal harm + misinformation  
  Public trust ↑, democracy protected
* **Kantian View**:  
  Allowing lies → fundamentally immoral

**Conclusion:**

* **Yes, invest** → ethical and profitable.