```
import React from 'react';
import { Download } from 'lucide-react';

const ProbabilityExercises = () => {
  const downloadPDF = () => {
    const content = document.getElementById('pdf-content');
    const opt = {
      margin: 15,
      filename: 'Exercices_5_6_Probabilite.pdf',
      image: { type: 'jpeg', quality: 0.98 },
      html2canvas: { scale: 2 },
      jsPDF: { unit: 'mm', format: 'a4', orientation: 'portrait' }
    };

    // Using html2pdf library
    if (window.html2pdf) {
      window.html2pdf().set(opt).from(content).save();
    } else {
      alert('Chargement de la bibliothèque PDF...');
      const script = document.createElement('script');
      script.src =
```

```
'https://cdnjs.cloudflare.com/ajax/libs/html2pdf.js/0.10.1/html2pdf.bundle.min.js';
      script.onload = () => {
        window.html2pdf().set(opt).from(content).save();
      };
      document.head.appendChild(script);
    }
  };

  return (
    <div className="min-h-screen bg-gradient-to-br from-blue-50 to-indigo-100 p-8">
      <div className="max-w-4xl mx-auto">
        <div className="bg-white rounded-lg shadow-xl p-8 mb-6">
          <div className="flex justify-between items-center mb-6">
            <h1 className="text-3xl font-bold text-indigo-900">
              Solutions Complètes - Exercices 5 & 6
            </h1>
            <button
              onClick={downloadPDF}
              className="flex items-center gap-2 bg-indigo-600 hover:bg-indigo-700 text-
white px-6 py-3 rounded-lg font-semibold transition-colors shadow-md"
            >
              <Download size={20} />
              Télécharger PDF
            </button>
          </div>

          <div className="bg-blue-50 border-l-4 border-blue-500 p-4 mb-6">
            <p className="text-blue-900 font-semibold">
              ðŸ“š Module: Probabilité | TD 2 | Année 2024/2025
            </p>
            <p className="text-blue-800 text-sm mt-1">
              École Normale Supérieure de l'Enseignement Technique de Mohammedia
            </p>
          </div>
        </div>

        <div id="pdf-content" className="bg-white rounded-lg shadow-xl p-10">

          {/* Exercice 5 */}
          <div className="mb-12">
            <h2 className="text-2xl font-bold text-indigo-900 mb-6 pb-2 border-b-2 border-
indigo-200">
              Exercice 5
            </h2>

            <div className="bg-gray-50 p-6 rounded-lg mb-6">
              <h3 className="font-bold text-lg mb-3">ðŸ“‹ Énoncé:</h3>
              <p className="mb-3">Soit (Î©, B, P) un espace probabilisé. X est une v.a.d
définie sur B dont la loi de probabilité est définie par:</p>
              <div className="bg-white p-4 rounded border-2 border-gray-200 text-center my-
4">
                <p>P(X = 1) = p,   P(Xâ‚‹ = -1) = q,   P(X = 0) = 1 - p - q</p>
              </div>
              <p>Soit Y une v.a.d définie sur B, de même loi que X, telles que X et Y
soient indépendantes.</p>
              <p className="mt-2">On pose Z = X + Y</p>
```

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            </div>

            {/* Question 1 */}
            <div className="mb-8">
              <h3 className="font-bold text-indigo-800 mb-4">1. Calculer l'espérance et la
variance de la variable Z</h3>

              <div className="ml-6 space-y-4">
                <div className="bg-blue-50 p-4 rounded-lg">
                  <p className="font-semibold text-blue-900 mb-2">Étape 1: Calculer E(X)
</p>
                  <p>E(X) = Î£ xáµ¢ × P(X = xáµ¢)</p>
                  <p>E(X) = 1 × p + (-1) × q + 0 × (1-p-q)</p>
                  <p className="font-bold text-blue-900 mt-2">E(X) = p - q</p>
                </div>

                <div className="bg-blue-50 p-4 rounded-lg">
                  <p className="font-semibold text-blue-900 mb-2">Étape 2: Calculer E(Y)
</p>
                  <p>Y a la même loi que X, donc:</p>
                  <p className="font-bold text-blue-900">E(Y) = p - q</p>
                </div>

                <div className="bg-green-50 p-4 rounded-lg border-2 border-green-300">
                  <p className="font-semibold text-green-900 mb-2">â€“ Résultat E(Z):</p>
                  <p>Z = X + Y</p>
                  <p>E(Z) = E(X + Y) = E(X) + E(Y)  (car X et Y indépendantes)</p>
                  <p className="text-xl font-bold text-green-900 mt-2">E(Z) = 2(p - q)</p>
                </div>

                <div className="bg-blue-50 p-4 rounded-lg mt-6">
                  <p className="font-semibold text-blue-900 mb-2">Étape 3: Calculer V(X)
</p>
                  <p>V(X) = E(X²) - [E(X)]²</p>
                  <p className="mt-2">E(X²) = 1² × p + (-1)² × q + 0² × (1-p-q)</p>
                  <p>E(X²) = p + q</p>
                  <p className="mt-2">V(X) = (p + q) - (p - q)²</p>
                  <p>V(X) = p + q - (p² - 2pq + q²)</p>
                  <p className="font-bold text-blue-900 mt-2">V(X) = p + q - p² - q² +
2pq</p>
                </div>

                <div className="bg-blue-50 p-4 rounded-lg">
                  <p className="font-semibold text-blue-900 mb-2">Étape 4: Calculer V(Y)
</p>
                  <p>Y a la même loi que X, donc:</p>
                  <p className="font-bold text-blue-900">V(Y) = p + q - p² - q² + 2pq</p>
                </div>

                <div className="bg-green-50 p-4 rounded-lg border-2 border-green-300">
                  <p className="font-semibold text-green-900 mb-2">â€“ Résultat V(Z):</p>
                  <p>Z = X + Y</p>
                  <p>V(Z) = V(X + Y) = V(X) + V(Y)  (car X et Y indépendantes)</p>
                  <p className="text-xl font-bold text-green-900 mt-2">V(Z) = 2(p + q - p²
- q² + 2pq)</p>
                </div>
```

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            </div>
          </div>

          {/* Question 2 */}
          <div className="mb-8 border-t-2 border-gray-200 pt-6">
            <h3 className="font-bold text-indigo-800 mb-4">2. Quelle la loi de Z?</h3>

            <div className="ml-6 space-y-4">
              <p className="text-gray-700">Z = X + Y, où X, Y â^^ {-1, 0, 1}</p>
              <p className="font-semibold">Valeurs possibles de Z: {-2, -1, 0, 1, 2}</p>

              <div className="bg-yellow-50 p-4 rounded-lg">
                <p className="font-semibold mb-2">Calcul des probabilités:</p>

                <div className="space-y-3 ml-4">
                  <div>
                    <p className="font-semibold text-indigo-900">P(Z = -2):</p>
                    <p>X = -1 et Y = -1</p>
                    <p>P(Z = -2) = P(X=-1) × P(Y=-1) = q × q = <span className="font-
bold">q²</span></p>
                  </div>

                  <div>
                    <p className="font-semibold text-indigo-900">P(Z = -1):</p>
                    <p>(X=-1, Y=0) ou (X=0, Y=-1)</p>
                    <p>P(Z = -1) = q(1-p-q) + (1-p-q)q = <span className="font-
bold">2q(1-p-q)</span></p>
                  </div>

                  <div>
                    <p className="font-semibold text-indigo-900">P(Z = 0):</p>
                    <p>(X=-1, Y=1) ou (X=0, Y=0) ou (X=1, Y=-1)</p>
                    <p>P(Z = 0) = pq + (1-p-q)² + qp = <span className="font-bold">2pq +
(1-p-q)²</span></p>
                  </div>

                  <div>
                    <p className="font-semibold text-indigo-900">P(Z = 1):</p>
                    <p>(X=1, Y=0) ou (X=0, Y=1)</p>
                    <p>P(Z = 1) = p(1-p-q) + (1-p-q)p = <span className="font-bold">2p(1-
p-q)</span></p>
                  </div>

                  <div>
                    <p className="font-semibold text-indigo-900">P(Z = 2):</p>
                    <p>X = 1 et Y = 1</p>
                    <p>P(Z = 2) = p × p = <span className="font-bold">p²</span></p>
                  </div>
                </div>
              </div>
```