Theoretical group assignment: You will be assigned a simple topic to work on as a group by your instructor. The questions include:

1. **Explore the difference between AWS CloudFront and a commercial 3rd party tool like Cloudflare. In what situation would you use CloudFront over Cloudflare and vice versa?**

Feature/Aspect	AWS CloudFront	Cloudflare
Integration with Services	Integrates well with AWS ecosystem services	Works independently but has integrations available.
Customization and Control	Offers high-level customization and control	User-friendly with simpler configuration options.
Pricing Structure	Pay-as-you-go model	Offers a free plan; pricing may vary for features.
Global Presence	Leverages AWS global infrastructure.	Extensive global network with data centers worldwide.
Security Features	Provides security features; may require additional AWS services for full security.	Emphasizes strong security with DDoS protection, WAF, and more
Ease of Use	Configuration may require more expertise.	Known for a user-friendly interface and easy setup.
Target Audience	Well-suited for users within the AWS ecosystem	Attractive for a wide range of users, including smaller websites.

2. **Explore the difference between AWS CloudFront and a caching tool like AWS Elasticache. What are the differences between the two? When would you use CloudFront and when would you use Elasticache?**

Ans:

Criteria	AWS CloudFront	AWS ElastiCache
Use Case	Content Delivery Network (CDN)	In-memory data store and caching service
Service Type	CDN	Caching and In-memory data store
Key Functionality	Content delivery, DDoS protection	Caching, real-time data processing
Data Types	Static and dynamic content	Key-value pairs, object caching

When would you use CloudFront and when would you use Elasticache?
Cloudfront: Serve static and dynamic content globally with low latency, Efficiently distribute static assets like images, stylesheets, and scripts, Accelerate delivery of web applications, APIs, and streaming eg spotify

Elasticache: reduce database load and improve response times, Can be used to store and quickly retrieve session data eg Airbnb, lyft, coursera

3. **Is AWS CloudFront a secure CDN? How does security in CloudFront work? Is CloudFront sufficient without alternative security tools like AWS DDoS Protection, WAF and Shield?**

Amazon CloudFront is a highly secure CDN that provides both **network** and **application** level protection. All CloudFront customers benefit from the automatic protections of AWS Shield Standard, at no additional charge.

AWS Shield Standard contains AWS WAF and Shield which comes free along with Amazon CloudFront.

CloudFront allows configuration to enforce secure, end-to-end connections using HTTPS SSL/TLS encryption. Cloudfront uses a field-level encryption. This means that when a POST request is done, sensitive data is secured from end to end. To the cloud edge.

AWS Shield serves the purpose of DDos protection
AWS WAF (web application firewall) for protection against application-layer attacks, such as SQL injection and cross-site scripting.

```
POST / HTTP/1.1
Host: example.com
Content-Type: application/x-www-form-urlencoded
Content-Length:60

Name=Jane+Doe&Phone=404-555-0150
```

Instead of taking this typical approach, field-level encryption converts this data similar to the following.

```
POST / HTTP/1.1
Host: example.com
Content-Type: application/x-www-form-urlencoded
Content-Length: 1713

Name=Jane+Doe&Phone=AYABeHxZ0ZqWyysqxrB5pEBSYw4AAA...
```

RSA key is generated on our end, and this enhances the security of it because only with our RSA key, are they able to decrypt the sensitive information. The disadvantage is that, if this key is stolen, then the decryption can surely be attained.

To address if cloudfront is enough without the additional services, I will say it is sufficient enough to prevent sensitive data to be stolen because of field encryption, however it may not be sufficient for DDos attacks or stealing / injecting data.

4. **Is AWS CloudFront better than other cloud providers' CDN tools? Do a quick research to illustrate the similarities and differences between the AWS, GCP and Azure CDNs.**

Yes, as aws cloudfront do not have much pre requisites to use, except multiple CDNs, AWS cloudfront has the most features compared to GCP and azure CDNs

Features	**Amazon Cloud Front**	**Google Cloud CDN**	**Azure Content Delivery Network**
Points of Presence (PoP)	410+	130	118 across 100 metro cities
Pre-requisites	Sign-up or create free account	Through an existing HTTPS load balancer	Azure account with an active subscription
Pricing	**Offers three pricing options:** • AWS Free Tier: 1 TB of data transfer out; 10,000,000 HTTP or HTTPS requests; 2,000,000 CloudFront Function Invocations • CloudFront Savings Bundle: A self-service pricing plan that helps you save up to 30% on your CloudFront bill in exchange for a monthly spend commitment for a one-year term. • Custom Pricing: Available for users willing to commit minimum 10TB data transfer per month for	Pricing calculated as per cache lookup, cache egress, cache fill, cloud storage and other factors. For ex: Cache egress pricing starts $0.02 - $ 0.20 per GB.	Pricing dependent on features, plan type, Microsoft agreement, location, and other factors.

	12 months or longer		
Instant Setup	Yes	Yes	Yes
Invalidation	Yes	Yes	Yes
Time to live feature (TTL)	Yes	NA	Yes
Integration	Integrated with AWS	Integrated with Google Cloud Platform	Integrated with Azure Services
Management of CDN	AWS Management Console	NA	Management via REST API, .NET, Node.js, or PowerShell
Video on Demand	Yes	No	NA
Multiple CDNs	NA	NA	Yes
Developer Friendly	Yes	NA	Yes
API	Yes	No	Yes
Origin Pull	Yes	Yes	Yes
SSL/TLS Encryption support	Yes	Yes	Yes
Bring your own certificate	Yes	No	Yes
Custom SSL	Yes	No	Yes
Field level Encryption	Yes	No	Yes
Video Streaming optimization	Yes	No	Yes
Large File optimization	Yes	Yes	Yes
HTTP/2 Support	Yes	Yes	Yes
HTTPs Support	Yes	Yes	Yes
Geo Access Control	Yes	NA	Yes
Analytics	Yes	Yes	Yes
Customization	Yes	Yes	Yes

Real time Statistics	Yes	Yes	Yes
Support	AWS Support	Offers different	Included in Azure Subscription

For more info, please refer to
https://www.znetlive.com/blog/comparing-top-5-cdns-amazon-cloudfront-vs-google-cloud-cdn-vs-ibm-cloud-delivery-network-vs-azure-content-delivery-network/